ELECTRICAL REVIEW

[ILLUSTRATED.]

A WEEKLY JOURNAL OF

ELECTRIC LIGHT, TELEPHONE TELEGRAPH AND SCIENTIFIC PROGRESS.

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The Hecla Electric Light.

In the dynamo of the Hecla Company, shown on this page, the inventor, Mr. Chas. T. Jackson, believes he has solved the problem of furnishing a machine for lighting in small quantities, the Jackson dynamo being made in seven different sizes, capable of running from twenty to 250 incandescent lights, and from two to twenty-five arc lights, according to the character and size of the machine. For running the small machines, a small coal engine or kerosene engine is used, either of which is made automatic in action. One of the incandescent machines is in use by the Westmoreland Hotel, of this city, and the company will soon have one with engine at the offices, No. 26½ East Forty-Second street.

The armature of the Jackson dynamo consists of the combination, with a shaft and disks mounted on the same, of soft iron wires placed on the rims of the disk parallel with the shaft, and of insulated wires wound lengthwise over the iron wires. Other wires pass around those, parallel with the shaft, to bind them together, and insulated copper wires are wound lengthwise over the core formed of the disk and the wires, as described. The ends of the copper wires form connections by means of set-screws instead of being soldered.

Magnetic Qualities of Iron.

It is well known what an influence the quality of the iron in the field magnets has has upon the ultimate output in a dynamo, and a case in point is mentioned by Mr. Gisber Kapp, showing how impossible it is to foretell accurately the performance of a dynamo, unless the quality of the iron be exactly the same in the manufactured machine as the sample submitted. In the case of two machines manufactured for him, there was a difference of electro-motive force of 20 per cent. between the two, although the machines were of exactly the same dimensions and treated in the same manner. It was imagined that in the first machine the iron magnets had not been sufficiently annealed, in consequence of the shortness of time allowed for the work. A second pair of field magnets were ordered and an extra time allowed for the work, the consequence being that 20 per cent. more electro-motive force was obtained.

The Toll Telephone in Indianapolis.

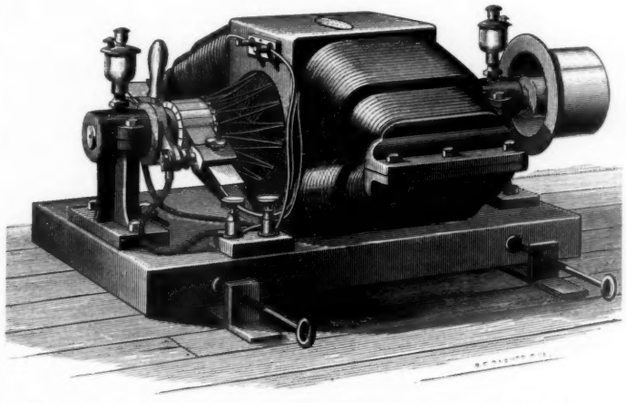
There seems to be a disposition on the part of many Indianapolis telephone patrons to favorably consider the toll line plan of service as proposed by President Phillips of the Central Union Company. Mr. Hockett, of the company, in an interview, said: "The idea is this: Each user of a telephone is to be considered an agent of the company; he is charged a certain amount for each time he uses or allows his instrument to be used. The more the instrument is called into requisition the less is the proportionate charge. The man in whose place of business an instrument is placed is paid a certain per cent. on all the business he transacts as agent of the company. As an illustration: A man has an instrument in his office, and his neighbors use the privilege of telephoning; at the end of the month the company collects the amount due on the business done, minus the agent's percentage. If $5 represents the total amount of business transacted in that length of time the company takes, say 60 per cent. and the agent 40, or $3 and $2 respectively. This appears to be a perfectly fair and business like arrangement and one that will work favorably for both sides, provided that enough such stations are maintained."

It is understood to be the purpose of the Central Union, if permitted, to extend its business on this plan, to supply facilities to the same extent, practically as heretofore.

A number of business men and manufacturers who were interviewed by a representative of the Indianapolis *Times* relative to the matter were almost unanimously in favor of granting the present company a fair trial of the contemplated plan.

Underground Wires in Cleveland.

Cleveland, Ohio, is agitating the underground wire question. An ordinance was introduced into the city council in relation to the matter by Councilman Hyman recently, but has not as yet been acted upon. H. H. Rebbeck, superintendent of fire alarm telegraph, is reported as saying, in answer to the question as to what he knew concerning the ordinance referred to, "I don't know anything about it. Nobody ever came to me or gave me notice of its reference. I read of its reference at the time in July last, and have been waiting since then for an invitation to meet with the board and discuss the matter. I am well satisfied that the conduit system, if properly done, will undoubtedly be a success Chicago has 10 miles of this system, carrying 1,000 miles of wire, and is in good working order. Detroit is now placing the wires under ground, and Milwaukee, St. Paul and Minneapolis have let contracts for the same purpose. In my last report I recommended its adoption in Cleveland, and spoke of the constant stringing of wires over house tops in such manner that it would be impossible for the fire department to operate the aerial ladder or raise even a 40-foot ladder, and I also spoke of the danger constantly arising from electric light wires."



THE DYNAMO OF THE HECLA ELECTRIC LIGHT COMPANY, OF NEW YORK.

Electricity and its Adaptation for Mines.

From the report of the English Commission on Accidents in Mines, we learn that, although mining accidents on a large scale are usually due to the ignition of explosive gases, the aggregate number of casualties from this cause is only 22 per cent. of the whole. The remainder are due to miscellaneous causes which appear to be inseparable from mining operations at great depths; but it is noticeable that 41 per cent. are caused by falling of material from the roofs and sides of the excavations, and are in many instances traceable to deficiency of light, or, more exactly, might be avoidable if the workings were more efficiently lighted. As regards the avoidance of accident by having a good light, the Commission makes the following observations: "The advantages in point of convenience and efficiency which attend the employment of electric glow lamps for illuminating the pit's bottoms and roadways immediately adjacent to it have already been demonstrated at several collieries where this utilization of the electric light has been combined with illumination at the surface by arc lights. In applying electric glow lamps to underground illumination, to the extent indicated, through the medium of conducting cables leading from the generators to the pit bottom, it is essential to safety, as well as to the permanent efficiency of the installation, that the cables should be placed in positions where they are thoroughly protected against possible accidental injury. It is also essential, in all mines where fire-damp has been known to occur, that the glow lamps should be excluded from direct contact with the air of the mine in one or other of the ways indicated in this report. Portable, self-contained electric lamps have been devised which will furnish for several successive hours a light considerably superior to that of the best safety lamps, and which at the expiration of eight hours and upwards will still give a light fully equal to that of a freshly lighted Davy lamp." It is added that the progress recently made in the construction of portable electric lamps affords promise of a speedy utilization of such lamps to an important extent in coal mines.

Of course, these lamps do not afford any indication of the condition of the atmosphere, and their use must, in most cases, be supplemented by fire-damp indicators and safety lamps. Our own belief is, says the London *Electrician*, in its comments on the report, that in the improvement of these two last-named appliances, both of which have now nearly reached perfection, lies the miner's chief immunity from explosion, always provided that the efforts to maintain ventilation are in no way relaxed. For exploring, and similar purposes, the glow lamp is invaluable. We should be glad if the miner could and would work with it and a portable battery affixed to his person; but we do not expect it, at all events not at present. We think, rather, that a wider extension of the lighting of the workings by means of the glow lamps, adequately protected, would lessen the ordinary dangers of his position, increase the amount of work he is able to perform, and enable him to do it with greater ease and comfort. The defect of the lamp as a gas indicator constitutes its great merit as a light-giver, being subject to none, or nearly none, of those risks which attend the use of even the best pattern of safety lamps. For it should be borne in mind that the presence of explosive gas is not of itself dangerous to life. The investigations of the Commission have, it is true, brought out the startling fact that a very small percentage, as little as two per cent., of fire-damp is an element of extreme danger in certain conditions. But such small proportions of fire-damp can be more easily detected by gas indicators than by the ordinary but dangerous method of a lamp flame. Moreover, if the gas, even in these slight proportions, is traveling at a rapid rate and accompanied by coal dust, the presence of an oil lamp rather enhances the danger of the situation. Hence, on many grounds, the substitution of more permanent illumination by means of the electric glow lamp for the ordinary miner's lamp would greatly reduce the normal risks, and, moreover, would allow of working in atmospheres which are at present unworkable.

One of the chief dangers, however, attending mining operations is the presence, already referred to, of coal dust in what are called dry mines. This coal dust, impregnated with a little marsh gas, forms a mixture as inflammable as gunpowder, and is, of course, in the highest degree dangerous when shot holes are being exploded for blasting purposes. Should the charge, instead of bursting inwards, blow itself out of the shot hole, a considerable body of flame is projected "as from the bore of a gun;" the dry coal dust is ignited, and the most serious consequences may ensue. "If," says the report, "a blown-out powder shot occurs in a locality where the atmosphere contains a small proportion of fire-damp (even not above two parts in 100 of the air), the presence of dry, fine and porous dust, even if it be only comparatively slightly inflammable, may give rise to the explosive propagation of flame to different localities, where either accumulations of inflammable or explosive gas mixture (as in goaves or old working places), or deposits of very inflammable dust, may take up the explosion and still further extend its disastrous effects."

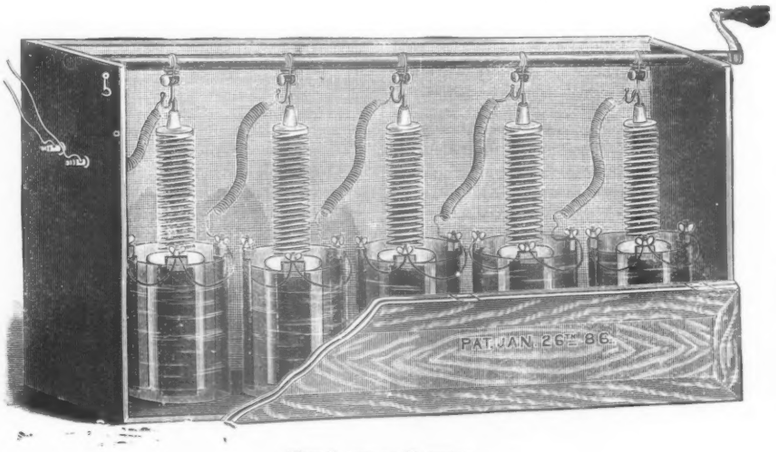
To the proper construction and management of these shot holes a good deal of atten-

tion has therefore been given by the Commission, and one of their recommendations is that electricity should be preferred for exploding the charge. The firing of the ordinary miner's fuse is a dangerous operation of itself, and may give out a flame sufficient to ignite the surrounding atmosphere. Their use is condemned in this report, and the use of electricity advised in the following terms:

"Electrical exploding appliances present very important advantages from the point of view of safety over any kind of fuse which has to be ignited by the application of flame to its exposed extremity, as the firing of shots by their means is not only accomplished out of contact with air, but is also under most complete control up to the moment of firing. Their simplicity and certainty of action have been much increased of late years, while their cost has been greatly reduced, and but little instruction is now needed to insure their efficient employment by persons of average intelligence. For the foregoing reasons, the use of electrical arrangements for firing shots in mines, where the employment of powder for blasting is inadmissible, should be encouraged as much as possible."

The Lathrop Plunge Battery.

This battery is put up in handsomely finished five-cell boxes, with windlass for removing zincs, as shown in the illustration. The manufacturers state that four of these cells with their "Little Giant" motor, illustrated in our issue of May 1st, will run any of the standard household sewing machines for 65 hours on one charge. Also, a dentists' or jeweler's lathe can be run by four cells. The U. S. Electrical Company, who manufacture these batteries, have also used them in lighting incandescent lamps up to six candle power.



THE LATHROP BATTERY.

Newspaper Men Testify in the Telephone Investigation.

The Congressional Committee appointed to investigate the Pan Electric telephone scandal has been hearing the testimony of the editors of several prominent newspapers. Mr. Whitelaw Reid, of the New York *Tribune*, testified that the news of Attorney-General Garland's connection with the Pan-Electric Company was published by him last fall after a convincing investigation by his Washington correspondent. No money had ever been paid the *Tribune* by either of the telephone companies. The New York *World's* Washington correspondent, Mr. T. C. Crawford, had paid a small sum to a party in that city, who had aided in furnishing the information. The testimony of Mr. Chas. A. Dana, editor of the New York *Sun*, was quite pungent and interesting, and the inquisitors did not come off victors. He had received a letter from E. N. Hill, dated Washington Nov. 9, offering the *Sun* a full history of the Pan-Electric matter. This was declined, Mr. Dana saying he did not desire to attack the Administration.

The Chairman—Did you regard Hill's letter as an attack upon the Administration? A.—Most decidedly. I regarded it as a scandal, most injurious, if true, to the Administration.

Q.—Has the *Sun* since then taken part in the discussion of the matter from that standpoint? A.—Always; and I have endeavored to influence public opinion, and to influence the Administration against any prosecution of the original Pan-Electric scheme of making the United States Executive a party to patent suits.

Q.—Did you change your mind in regard to attacking the Administration? A.—I have not; it was necessary to criticise the Administration—not to attack it—in the sense of publishing any scandalous reports. I discriminated very strongly between seeking out and publishing allegations and facts of a scandalous nature and injurious character, which are yet to be verified—which may be true—and commenting upon facts which are notorious and unquestioned.

Q.—You say that you have endeavored to influence the Administration against the prosecution of a Government suit? A.—Not to participate in the prosecution of a patent suit. It seems to be fatal blindness and inexpressible folly for the President to engage the United States in a private controversy.

Q.—Then your view have been, I presume, that it is improper to use the name of the Government, or for the Government to become a party to the revocation of a patent alleged to have been obtained by fraud? A.—The question is one that is sure to be decided in the ordinary action of the courts, without the Government being a party. I see no reason for the President being involved in it, and still less when the proceeding originated with a lot of dead beats, who should not be tolerated in any respectable party.

The Chairman inquired if he meant the Attorney-General, to which the witness responded in the negative.

The Chairman—Do you refer to Senator Harris? A.—No, sir.

Q.—To the Rogerses? A. (dryly)—They are poets.

Q.—I understand you to say that the use of the Government's name is not necessary—that the same results can be obtained in a suit between parties? A.—It is sure to be obtained.

Q.—Do you know of any such suit? A.—I do not. I can see no difference between the revocation of Bell's patent on the ground that he obtained it by fraud and a decision of the Supreme Court to the effect that the patent belongs to Drawbaugh.

Mr. Dana having alluded to the Pan-Electric organizers as speculators, Mr Boyle wished to know why he distinguished in that way between the Pan-Electric and the Bell people. The witness replied that the Bell Company was a regularly organized company, having rights that had been recognized by the courts, while the Pan-Electric people were attempting to get recognition—selling stock and giving it away in various manners for that purpose.

The Chairman—Have you any knowledge that the Bell Company was once in that condition? A.—I don't know anything of the Bell Company.

Mr. Millard (to the Chairman)—You don't mean a similar condition?

The Chairman (positively)—Very much alike. It appears in the evidence before this committee.

The Chairman (to the witness)—Your view has been controlled, then by the legal question? A.—And the political question.

Q.—Law and politics, then, have controlled the *Sun* in the discussion of the Pan-Electric enterprise? A.—That is a general statement.

Continuing, the witness said that he had repeatedly expressed the opinion that the President could not bring a patent suit without a special statute. No articles had been published in the *Sun* at the instance of the officers or individuals of the Bell Company. They had been published without solicitation or suggestion from any quarter.

The Chairman, with some hesitation, said: "It is hardly necessary to ask whether anything has been paid." The witness smiled and replied that nothing had been paid.

Mr. Boyle asked if the witness had conferred with the Bell attorney on the subject. He replied that he had conferred with Mr. Dickerson, an old friend, on the scientific question. "I have had quite a dispute with him on the subject," Mr. Dana added.

"And yet your views seem to have been alike," remarked the Chairman.

"They are more alike now than they were at that time," replied the witness. "Mr. Dickerson, from the first, when the Interior Department proceedings were pending, held that a Government suit would be brought, while I denied it, saying that no President endowed with good sense and a consciousness of uprightness would allow such a suit to be brought."

Mr. Oates then inquired the witness's reason for regarding the Pan-Electric as a scandalous concern. Mr. Dana replied:

I have never been able to imbibe much respect for the poets who originated it. The scandal consists in using the Attorney-General—making him a stockholder, and then using the Department of Justice to promote purposes of private speculation. That, I think, is a scandal.

Mr. Oates—Are you aware that he became a member of the association long before he was appointed Attorney-General? A.—He was a member, as I understand it, while a United States Senator, and instead of imitating the example of General Lefevre or Mr. Beach, who sent back this gratuity, he kept it and that, I think, is not a proper proceeding.

P.—Are you not aware the stock they returned was stock of a different organization—Postal Telegraph? A.—Nominally, nominally. I understand that the stock was issued by the same interest. The Pan-Electric was a branch of the same concern. It is merely a question whether a public officer should be interested in an establishment on which he may be required to vote in his official capacity.

Mr. Oates inquired if the witness did not know that the Attorney General had been absent when the application for the Memphis suit had been made. The witness replied that he did; but no scrupulous Attorney-General would have been away and allowed such a thing to be done.

Q.—Suppose he did not know that the application was to be made? A.—He ought to have known that there was a mighty sharp set of fellows around. The Attorney-General should not have allowed it. He should have resigned rather than have had anything to do with it.

Q.—That is a pretty high standard. A.—Not too high for an officer of the American Government.

Mr. Oates inquired if the witness was aware that none but the Rogerses had disposed of their Pan-Electric stock, to which he replied, "But they got dividends." He said that he knew nothing of the Bell Company except that it charged extravagant prices for telephones. He did not think that a Government officer should be connected with the Pan-Electric if the Government was to be brought in as auxiliary prosecutor in behalf of the Pan-Electric, but he had no objection to Government officers holding bank or railroad stock. In answer to Mr. Oates's questions, he maintained that a private patent suit would be the same as a Government suit, in effect. He did not understand that there was any such practice of instituting Government suits as had been followed in this case, and did not know that ten such suits had been ordered by the Government since 1871. He gave his opinion, but with great modesty; he was not a lawyer. The testimony concluded with a question from Mr. Millard:

Q.—If Mr. Garland had found on his return that they had taken advantage of his absence to institute suit, should he not have discontinued the suit or left the department? A.—That is what I think.

Q.—He should have discontinued it? A.—He should have smashed it.

Mr. Geo. Jones, of the New York *Times*, was the next editor to testify. He said he was an owner of the *Times*, and had a small voice in its editorial management. He believed that Van Benthuysen had inserted some advertisements in his paper. The article treating of the Bell Company that had appeared in the issue of January 1 last had not been published by any arrangement of his, but had been procured by the advertising agent. He knew that a long article had been printed in the paper called "New York City's Growth and Commercial Development of the American Metropolis," and that ninety-six different kinds of business were represented in it, all marked with stars, indicating plainly that they were paid advertisements. They were all (including the Bell article) paid for at $300 a column. The Bell Company took 2,000 copies of the issue, and other firms took more or less copies. No money had been paid to the *Times* in this matter except for advertisements.

Mr. Ranney wished to know how much Van Benthuysen was paid for his advertisements in the *Times*. The witness said he had paid no money; he would not respond to the bill; it had been returned marked "N.G." The whole subject had no interest for him. He had taken no pains to investigate the Rogers letters, and had not instructed the Washington correspondent to look into it; the correspondents were instructed by the editors, and not by himself. He had not immediately controlled the course of the editors of the paper. He presumed that they had given the subject as much space as it was worth; he was not the New York *Times*.

Mr. Ranney challenged the witness to produce any *Times* article intimating that anything damaging to the Pan-Electric had been developed in this investigation. The witness replied that Mr. Ranney could consult a file of the *Times* and ascertain for himself; he ought to realize that one man could not know of everything that appeared in a paper.

Mr. Ranney having repeated his question as to whether anything damaging to the Pan-Electric had been published in the *Times*, the witness referred to Gen. Johnston's letter refusing to sell stock on the ground that he would be regarded as a swindler; that might have been unfavorable.

Q.—Was there anything looking to influencing the *Times* as a public journal? A.—While I was absent I understand that a lawyer named Dickerson called at the *Times* office and offered matter.

The Chairman wished to know the witness's reason for supposing that other New York papers had been in the pay of the Bell

Company. He replied that he could only say that after Dickerson's visit to the *Times* office a number of long articles containing about the same arguments that were in Dickerson's article had appeared in three or four papers, which had led to the suspicion that there was some influence which caused the publications. It seemed that the subject had suddenly become interesting to three or four papers simultaneously.

An Industrial Exposition at Minneapolis, Minn.

The enterprising citizens of Minneapolis, Minn., have decided to establish a permanent Industrial Exposition, and the REVIEW takes pleasure in endorsing the project and presenting to its readers a view of the Exposition building. This exposition is not only an exposition of the great industrial interest of Minneapolis, but will graphically represent the wonderful powers and products of the great Northwest. It will not even be confined to the vast regions of the Northwest, but will be augmented in attractiveness by rare exhibits of art, science and industry from all parts of the United States and from foreign countries. For an exposition of so comprehensive a character a building well adapted to the myriad requirements of the situation is a matter of prime importance. This fact has been intelligently appreciated by the exposition directors, who have spared no pains to make all arrangements with regard to the building as perfect as possible In order to profit by the experience of other expositions the building committee visited leading eastern and southern cities where structures have been erected for similar purposes. The valuable information thus gained has been utilized in planning the construction of the Minneapolis Exposition building, which will thus be the result of the combination of the best features of many other structures and therefore most perfectly adapted to the uses for which it is designed.

The Exposition Association has a cash capital of $300,000, besides land valued at $200,000. Its stock is owned by nearly 2,500 enterprising citizens of the city, which shows the general interest taken in this great affair. The exposition will be open for six weeks from August 23, 1886. We are informed applications for space are being received from all parts of the Union, indicating that the value of the opportunities offered are quite well appreciated. All space will probably be engaged long before the opening of the exposition. The electrical companies should be well represented.

NEW EXPOSITION BUILDING, MINNEAPOLIS, MINN.

A Question of Freight.

We have always given the managers of the Bell Telephone Company the credit of being sagacious business men, but why they paid the New York *Times* $1,200 for an article that could not have done them a dollar's worth of good is a mystery.—*Herald.*

Possibly the "literary bureau" of the company might enlighten you. The gentleman who passed the article over to the *Times* probably had to have his little commission. You remember the Hebrew who, when the miner expostulated with him for charging 25 cents for a darning needle which cost less than a halfpenny at 'ome, said: "Put you forget der freight, my tear. You forget der freight."—*Boston Commercial Bulletin.*

His Circulation All Right.

Editor (anxiously)—"Well, doctor, what is the matter with me? Nothing serious, I hope!"

Doctor—"H'm, well, you are in a bad way. Your circulation is very low."

Editor (excitedly)—"What? Why, sir, I have at least 200,000 a day. You have been reading a rival sheet, sir.—*Philadelphia Call.*

A Remarkable Telegraph Feat.

On the 8th of April last, the date of Gladstone's great speech on the Home Rule bill, the number of words signalled from London was 1,500,000, the greatest number signalled on any previous occasion being 860,000. It will be seen from these figures that very little more pressure was required to have doubled the record. The apparatus used in dealing with large quantities of news is the Wheatstone automatic, and no less than 100 Wheatstone perforators were brought into operation on this occasion. Of these 30 were of the kind which punch six slips simultaneously, 13 were of the kind which punch three slips simultaneously, 31 were of the kind which punch two slips simultaneously, and 26 were single slip perforators. The amount of writing performed by the reporters may be estimated from the fact that the number of sheets of "flimsy" dealt with in the Central Telegraph Office on this single evening was about 15,000. The figures so far are impressive enough, but they give merely the words signalled from London. In many cases one wire from London serves several offices, so that the same message which is signalled from London is read by each of these offices simultaneously. For example, there are wires from London which work simultaneously to Birmingham, Manchester, and Liverpool. A thousand words transmitted, therefore, upon this line are equivalent to three thousand words received—that is, a thousand each at the places named. The work on the subsequent evenings of the debate, though not so great as on this special occasion, was extremely heavy. The total number of words signalled from London on the evening of the 9th inst. was about 600,000. The number signalled on the 12th was 504,000, and the number signalled on the 13th inst. was about 500,000. These figures speak for themselves, and no credit which may be given to the Post Office officials is more than they deserve in carrying such work through without a moment's delay. The English folks are proud of this achievement and claim that there is no other office in the world that would have been equal to such a demand.

A Novel Electric Toy.

The latest thing in electrical toys, and by far the most interesting simple mechanism that has appeared among children for many a day, is a little board which will answer almost any question which a child will put to it either in geography, literature, Biblical and general history, chemistry, astronomy, art, and many other things. The curious mechanism is thus described by *Geyer's Stationer*, the representative journal of the stationary and toy trades:

"Upon a board two feet long and one foot wide a multitude of little copper pins are made to stand perpendicularly and in straight lines. At the top of a board is a small electric battery from which two fine wires proceed. At the end of one of these wires there is a little copper hood or thimble and at the end of the other a copper pin. Suppose now a child, say of seven years, to be asked: 'Who is the author of 'Corinne?'' It searches among a number of cards until it discovers one marked at the top 'Authors.' This card is perforated in such manner that when it is laid on the board the little copper pins will stand up through it perpendicularly. The child searches among the questions on the board until she finds, 'Who is the author of Corinne?'—for which an answer is required. There is a hundred of these questions, and when she gets to the right one she places the little thimble which is at the end of the left hand wire over the pin which juts up through the cardboard in the middle of it. To get the answer now is an easy matter. Taking the copper pointer—at the end of the other wire—in her right hand, the child passes it down and up the rows of copper pins on the right hand side of the board, carefully touching each pin before passing it. This the child continues to do until, upon touching one of them, the little electric bell at the top of the board rings furiously. Then triumphantly the child reads the name immediately under this particular pin. This name is Madame de Stael."

* * M. Moissan has made an interesting observation to the effect that red-hot platinum combines with penta-fluoride of phosphorus, as with phosphorus itself. The platinum in the experiments was heated by an electric current, and when brought into an atmosphere of the penta-fluoride of phosphorus, it was seen to melt rapidly. Tried with trifluoride of phosphorus, a similar result was obtained.

* * Prof. Tichenor, of Hamilton, N. J., worked four years on a flying machine and was confident that he had at last caught the elusive secret of aerial transit. But last Tuesday evening, like all his predecessors in the same field of research, the professor came to grief. He attempted to sail into space from a platform one hundred feet high, and fell the entire distance. He says he knows just where his plan was lacking, and as soon as his broken arm and leg and the contusion of his spine are healed, he proposes to try the experiment again.

The Fitzgerald Secondary Battery.

In Mr. Desmond Fitzgerald's secondary battery the negative plates are formed entirely of peroxide of lead in the form of hard slabs, so that the action takes place throughout the whole mass, suitable terminals of an inoxidisable material being provided for the slabs. This arrangemen obviates the necessity of having perforated lead plates to contain the peroxide. It is stated that 16 ampere hours are obtained from every pound weight of these plates. The positive element consists of spongy lead in a new form, which admits of the plates being bent or rolled without damage to them. Some 27 ampere hours per pound weight are obtained from these. A one horse-power cell recently sent to Paris gave 10 ampere hours, or 20 watt hours, per pound of plates; the total weight of the cell, everything included, being 75 lbs. Mr. Fitzgerald has also found that sulphate of magnesia, or Epsom salts, has a remarkable power of fixing peroxide in the "forming" process, and is greatly superior to the ordinary acid electrolyte. This reduces the first cost of the batteries considerably.

Where Maud S. Got Her Name.

The society columns of a Cincinnati paper not long since contained the following:

"Miss Maud Stone entertained a number of her young friends at her father's elegant home in the East End one night recently."

I think I hear you say, remarks the gossip of the Philadelphia *News*, "Well, I don't see anything strange in a notice like that."

There is not, only the young lady mentioned is the one the fastest trotter in the world was named for.

Her father had purchased the young filly from a gentleman named Bugher for $300. Not long after he took a friend out to Chester Park to look at some racing stock. The filly was in the "infield," and as they walked towards the stables Captain Stone, the genial and widely known general manager of the Cincinnati Telephone Company, said:

"There is a filly I bought the other day, and I think she has a turn of speed."

His friend looked her over and liking her points remarked:

"Start her up and let's see how she moves."

Taking off his silk hat, the captain rattled it with his hand, and the fine young animal started off on a three minute clip.

"Why, she's a natural trotter," was the comment.

"She is, indeed," replied the captain, with commendable pride in his purchase. "I wish I knew a good name for her, he added.

"Why not call her after one of your children?" asked the friend.

"I had not thought of that," was the reply made as they walked away.

The friend thought no more of the filly for about two weeks, when he met Captain Stone coming out of the post-office.

"Hello," said he, "I have acted on your suggestion and have just posted the letter claiming the name for my filly. I am going to call her after my daughter Maud."

"Maud Stone will be a pretty name," responded the friend.

"Oh! I'll not call her the full name," replied the captain. "You see, I wouldn't like to see her full name on a race card, so I have called her Maud S."

*** The Missouri and Kansas Telephone Company has declared a quarterly dividend of $1.00 per share, payable May 1st. At this meeting of the directors it was ordered that hereafter the transfer books of the company be closed for the transfer of stock on the 25th day of July, October, January and April of each year; and be re-opened on the 2d day of August, November, February and May.

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EDITORIAL ANNOUNCEMENT.

Address all communications and make all Express Money orders, P. O. orders and checks, payable to order of ELECTRICAL REVIEW, P. O. Box 3329, New York.

We invite correspondence from Electricians, Inventors and the Telegraph and Telephone fraternity and those engaged in Electric Lighting on matters pertaining to electrical and scientific subjects, and all facts of special interest in connection therewith.

We extend to manufacturers of electrical apparatus an invitation to send to this office any and all facts concerning their business which will be of interest to the public. We make no charge for publishing news.

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Frank M. Gilley, 54 Equitable Building, Boston, Mass., is our New England representative.
Mr. C. C Haskins, 118 LaSalle Street, Chicago, Ill, will represent the REVIEW in the West
Messrs. Wm. Dawson & Sons, 121 Cannon Street, London, England, are our representatives for Great Britain.

NEW YORK, MAY 15, 1886.

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There are occasional complaints that the telephone can't be "heard." When the proceedings in Indianapolis and Washington are considered, the "hearing" would seem to be as abundant as could be asked at the present time.

Mississippi has enacted a law regulating telegraph companies, the second section of which says: "That if any person to whom a message is sent lives beyond the corporate limits of any city, town or village, the telegraph company shall cause the message to be mailed to the address of the person to whom such message is sent." In such a case where the message must be put in the post-office and await its chances, it would be a misdemeanor to send the message immediately by hand. This act would seem to be a good thing for the telegraph companies.

By the way, when is that Government suit against the Bell telephone patents to be called up for hearing?

"There is danger in the electric light!" cries an organ of the gas-lighting interests. Yes, indeed; "danger" that gas will be crowded to the rear.

The organization of the New York Electric Club seems to have been a happy inspiration. It is evident that it will be a growing success. The organizers made a wise choice in placing a gentleman of the broad and comprehensive views of Mr. H. C. Davis at its head. The next meeting of the club is called for May 20.

The Sprague motor was given a trial in this city last week, and, as an experiment, said to have been successful. The usual familiar number of capitalists were present. Lieut. Sprague is a capable gentleman and an earnest student of this branch of electricity, and we hope he will be able to enlist proper aid and proper management in advancing his valuable work.

Our telephone readers will be interested in the decision of Vice-Chancellor Bird, mentioned on page six. Should the decision hold in the Court of Errors and Appeals, the company operating in Newark, N. J., will be entitled to continue in business; otherwise the New York and New Jersey company will control the territory and operate the exchange. The first decision, prior to Chancellor Bird's, was in favor of the latter company, but the plea of new evidence secured another hearing and a different decision.

WAR ALONG THE CABLES.

The rate war between the Commercial Cable Company and the pool lines has now set in in earnest, and the progress and final result of this contention is likely to be instructive. We have often seen in the case of the telegraph lines that what at first seems spirited opposition on the part of a comparatively feeble rival often turns out to be only a game of hoodwink and deception, inaugurated with a single purpose of finally selling out at a high figure. So many examples have we had of this nature that the public has become both disheartened and disgusted, and anything like faith in the promises of competing telegraph lines was long since shaken.

For this and some other reasons, it is with something like surprise that we find—if the published statements are reliable—a sorely afflicted public engaged in supporting the Commercial Cable Company against its powerful and not over scrupulous rival, the pool lines.

Perhaps because of the presence of certain men in the pool line management, the public is now paying a larger rate to the Commercial Cable Company, and taking the risk of a possible future consolidation.

The Gould-Field pool, which up to a recent date was extorting fifty cents a word from the public for ocean messages, have now come down to twelve—a rate which would not pay running expenses on the original cost of the pool lines, to say nothing of paying interest on fifty per cent. of watered stock. And all this to compel the Commercial Cable Company to sell out to them, or else raise their tariff to sixty cents a word.

It is commendable in the Commercial Cable Company that they neither raised their rates to sixty cents a word in the first instance—for this would have been extortion—nor have they even reduced their rates to twelve cents the word, which would have been meeting the pool on equal grounds, but made it impossible to continue business for any length of time.

It was assuredly a tough nut to crack, and yet it seems, all things considered, that the course which is being pursued is the logical one. It has reduced its rate from forty cents to twenty-five, and calls upon the public to sustain them. This call, it is said, is meeting with a generous response from the public, or, at least, a certain portion of it who are paying the Commercial Company twenty-five cents rather than twelve cents to the pool lines. We sincerely trust that the public is not once more to be deceived, and thus to be made to lend their influence toward enhancing the selling price of this Commercial Cable Company's lines.

There is good circumstantial evidence to prove that this Commercial Cable Company is, to use a slang phrase, playing a square game, and that its owners are sincere in their determination to hold out at all cost, if only the business community will aid them with their patronage. It is a commendable declaration, and we believe it to be an honest one. So far as the interests of that portion of the community which does cabling is concerned, the broad and far-seeing policy is assuredly to pay the Commercial Company twenty-five cents a word rather than the pool twelve. For, if the pool succeeds in compelling the Commercial Company to sell out to it, it is tolerably certain that the rates will be advanced to sixty cents, and perhaps even to seventy-five, in order to make up for the heavy losses which the pool is now incurring in fighting its rival.

Hence it is the part of prudence to study his question before helping the pool and this unprincipled backers.

ELECTRICAL NEWS OF THE WEST.

Chicago has passed through an eventful week, and one such as every good citizen prays may never be repeated. But for our excellent patrol and police telephone and signal system, it is altogether probable much worse results might have gone on the record. For some time the struggle between capital and labor has been agitating the public mind, and this, coming as it did just previous to the 1st of May—a date fixed for the eight hour movement—rendered the situation a complex one. This, too, is the season of the year when worms and bugs in the animal kingdom seek the day and the warmth of the sun, and those other vermin of the earth, the free-lunch fiend, the anarchist, the socialist, the communist—in short, all who train round Sundays in the wake of black or red flags, and howl about liberty and freedom of speech, and rights, and all that sort of thing, when the fact is that all these virtues are as far from having a home in their bosoms or a resting place in their thoughts, as heaven is from their natural home.

For several years these despicable, festering floaters on the social sea have been holding meetings within the corporation limits, and their mouthings and vaporings have been looked upon as, at the most, only vile and scummy. They have hardly done any thing which can render them amenable to law; yet it is now known that they have to some considerable extent carried out in practice what their leaders have so constantly preached. The culmination of their deviltry was reached on Tuesday evening at a meeting on Desplaines, near Randolph street. The times have been considered opportune by this element of society, and the McCormick reaper works were made the objective point on Monday, the mob, which proposed storming the works, being repulsed by the police. This mob was not made up of strikers or disaffected workmen, in any form, but was composed of men who never work, except on compulsion, women who help these husbands and brothers to do nothing, and idlers who are always ready for a lark. Lives were lost among the rioters, and this was made the pretext for a grand demonstration as above, on Tuesday evening.

The officers had orders to disperse the meeting, and a large body of police having arrived where the speaking was going on, the commanding officer, in the name of the State, ordered the dispersal of the mob, when a dynamite bomb was cast into their midst, and exploded. No less than fifty policemen were injured—four died within two days, while several others are severely, if not fatally wounded. Then came the turn of the police, who won the fight in short order, putting the crowd to flight.

All the leaders and instigators are safely confined, held without bail to await the action of the grand jury. Two socialistic newspapers have been suppressed, and not only the editors but the printers, from foreman to devil, were gobbled. In the premises lately occupied by these self-constituted law makers were found dynamite and other evidences of their guilt. Type, still in the forms, from which incendiary bills had been printed, and among other minor weapons, a three cornered file, the edges of which were keen enough to shave with—an instrument such as none but a communist or a socialist would ever dream of.

By means of the police telephone and signal system in use here, it has been possible to communicate with headquarters at a moment's notice, and several incipient emutes have been summarily disposed of. One unfortunately druggist who had been suspected of reporting the condition of things in his neighborhood, which is in the vicinity of the Bohemian Socialist headquarters, suffered severely. On the fourth instant these unhappy persons, after adjournment of a meeting, and a few inspiriting quaffs, organized themselves into an army of seige, and went for the drug store windows with bricks and stones until the front was completely destroyed. The telephone was also battered to pieces. The contents of the store were scattered far and near. The thirst for plunder, which is one of the mental constituents of this species of freebooter, was only partially gratified, and the following day a saloon, next the drug store, was raided, the choice foreign and domestic liquors for family use," finding hiding places in the stomachs of the mob. The street police telephone box was also cleaned out. Word finally reached the police, and the mob was a third time scattered.

With the arrest and confinement of the ringleaders, it is believed that the troubles are now over. Large amounts of money were raised within twenty-four hours, for the benefit of the wounded officers. No less than $12,000 was voluntarily contributed within the first day, and any amount of assistance in the way of volunteer officers, civic and military, was tendered, but declined with thanks by the authorities, who believe that all danger is past. The subscription, which is voluntary, has been constantly increasing in volume, until from present indications there is every reason to believe it will reach at least $60,000. These funds go into the hands of the Policemen's Benevolent Association, and will be used indiscriminately for the members and non-members of the association.

Considerable numbers of second-hand arms of the most heterogeneous character have been seized by the officers, and no inconsiderable quantity of dynamite and other outrageous compounds have been captured. It looks as if we might have a neck-tie party out of the row by-and-by.

Aberdeen, Dakota, was lighted for the first time by electricity on the night of the 1st instant, when the town went wild by common consent. Processions and speech-making were indulged in. The city of Fargo is the only other town in Dakota having the electric light.

Some weeks since, a fireman's paper published a recipe for keeping battery jars clean with oil, which was brand new to the editor. Now a correspondent who signs himself "Electric," writes to the editor. He says: "The use of oil is an old way. The best, and cleanest method is to paint the top of the jar red on the inside."

Once on a time, the fire boys of a town in the old volunteer days formed a company and bought a goose-neck machine. When the question how to paint it came up, the Chair called the meeting to order, and briefly stated the object of the meeting, punctuating the sentence with a tobacco juice period. Then:

A Member—Mr. Chief, I move that we painterred (spit), by———.

Second Member—Second the motion, by ———(spit).

The Chair—It's moved by ——— and seconded by ——— that we paint erred, by ——— Carried by ———

Meeting's adjourned. (All spit.) And from that day, "any color so it is red" is the fire worshiper's pride, and the proper hue for even his battery jars.

The Western Edison people made a very pretty show in the way of ornamentation the other night at Kinsley's restaurant. The occasion was a farewell supper to the Rev. Father Conway, who sailed for Europe in the Umbria on the 6th. A ship—the Umbria—a vase and two baskets, all beautifully wrought of flowers, decorated the table, and mingled in with these was a large number of tiny incandescent lamps, varying from one-half to six candle-power each, producing a most beautiful and novel effect.

At Jacksonville, Ill., there is a State institution for the deaf and dumb, which is lighted by the Edison system. The method by which the plant was obtained is a little peculiar, rather ingenious, and well illustrates the old saw about the number of ways of skinning a cat.

The party in charge was so desirous of testing the effect of electric light on the constantly strained eyes of the unfortunate inmates that he resolved to use the money which was allowed by the State for illumination, to rent an electric light plant, and, provided the results at the end of the first year should prove satisfactory, to continue this until an appropriation could be obtained to buy the plant.

The light did prove much more satisfactory than any which had been previously used. It was decided not to worry with the Legislature, but to arrange to apply the monthly rental as payment on the plant. This was done, and to-day, three years after the installation of the plant, the State has paid for and owns it, and that too, without any appropriation for the purpose. The house circuits are so arranged that the full capacity of the machine can be utilized in any one department of the building, at any time. Thus the dining-room is lighted when the school-rooms are in darkness, and *vice versa*, and other portions of the house can be similarly illuminated. The great gain, however, is in the marked improvement of the character of the light over that of candles or gas, as shown in the more healthy condition of the unfortunate inmates' eyes.

The Fort Wayne Jenny people have just opened a branch office in the Montauk block, on Monroe street. Mr. W. J. Buckley, who is well known here as an electric light man, having formerly represented the Excelsior Company, will have the management of the Chicago branch.

The Rock Island Railroad depot, on Van Buren street, now has both the Jenny and the Bain systems of arc lights. The latter is an exhibition plant of five lights recently put in. Take it all in all this depot is now well lighted. Mr. Foree Bain, the inventor of the Bain system, has severed his connection with the Bain Company, and opened an office and works at 95 and 97 Indiana street, as an electrical engineer and manufacturer.

On the 5th inst. license was issued by the Secretary of State to the Consolidated Railway Telephone and Signal Company, of Chicago, with a capital stock of $5,000,000. Incorporators, Wm. Vogel, Fred. V. H. Binder, and Edgar B. Telman.

The good people of Indianapolis are becoming restive under the wait-a-little-while-and-you-will-be-fixed-all-right-by and-by-policy of the authorities, who do not seem inclined to either fish or cut bait. The *Times* of the 5th says: "Let us have an effective telephone service at legal rates, and let us have it quickly. Let all the companies desirous of giving us a service have a fair field and no favor. In plain language, let a city franchise, containing, of course, strong restrictions as to leasing or sub-leasing, and also clauses of forfeiture in the event of failure to give good service, be granted to the highest bidder. There is no reason for delay in the habilitation of a new company. The people want a telephone service, and there are numerous companies read to give it."

In the *Journal* of the 6th instant, the scientific editor takes a whack at the question, from a different standpoint. This solon gravely remarks that "The sensible thing for the City Council and Board of Aldermen to do, before granting any charter to a new telephone company, is to require a long distance practical test of the competing inventions. Some instruments may make a very satisfactory showing in a room or for short lines, that are utterly worthless in the open air, or for a distance of some two or three miles where the resistance of the air, the winds, or a collection of strung wire has to be overcome." The deep unfathomed caves of erudition from whence that fount of wisdom flows are only equalled by that storehouse of modern French which an American professor drew from when he read the following translation from Bailey's ancient geography. "The Indians have existed in bodies of peoples since very long time."

The Citizens' Co-operative Telephone Company, of Indianapolis, held a meeting on the fifth, and organized. They will use the Wallace Telephone, if they ever use any, and "it is stated that they have sufficient financial backing to fight any suit that may be brought against them."

Col. Lynch, broker, 146 La Salle street, furnishes the following stock quotations:

Chicago	$350 @	$365
Central Union	40 @	45
Michigan	64 @	66
Iowa Union	15 @	18
Great Southern	25 @	30
Great Southern, Script, 65 cents on the dollar.		
Colorado	18 @	20
Rocky Mountain Bell	40 @	45
Missouri and Kansas	53 @	55
Missouri and Kansas, Script, 53 cents on the dollar.		
United	15 @	17
Cumberland	69 @	72
Wisconsin	108 @	110
Bell of Missouri	147 @	150

CHICAGO, May 10, 1886.

BOSTON ELECTRICAL NEWS.

The spring has opened in real earnest, and, were it not for the unsettled condition of the labor interests, the electrical companies would be unable to fill their orders. The legislator from the rural districts is considering the question of planting wires; the perpetual-motion man is hoping to bring out his electrical generator, which requires no power to run it; while his next-door neighbor is experimenting with the bamboozle filament, which, when once heated to incandescence, does not cool, and requires no further current. We hear now and then that some new style of unregenerated gas burner has just been tested by some gas engineers, and found to give wonderful results. Nothing is said of the failure of the burner after a few days' use or of the intense heat generated.

The principle of running incandescent lamps in single series, as recently advocated by Bernstein, is by no means new. Such a method has been in use in this country for some time for street lighting. To run a current of the high potential of 3,000 volts into private dwellings, and without any regulating mechanism, seems, to say the least, to be a very undesirable experiment. If by any chance there be a break in the connections or in the line wire in the house, the full 3,000 volts would be effective to form a powerful arc. A bare wire or badly-insulated lamp socket exposes one to a dangerous current. However useful his system might be when employed for street lighting, it certainly has no place in private dwellings. It is claimed that in running a number of such series from a central station that, in the event of a large number of lights being turned off, two or more lines could be placed in series on one dynamo. Let us examine the economy of this method. If there are 300 ohms in the lamps and 30 ohms in the wire, allow 10 per cent. loss in conductors; where a large number of lamps are turned off, we might have 30 ohms in the lamps, but still 30 ohms in the wire, 50 per cent. loss in conductors. Now, if still more lights are turned off, the percentage of loss increases, and becomes nearer to 100 per cent. as lamps are turned off.

A District Messenger Telegraph Company has been formed at Lynn, Mass., and 150 subscribers have been secured before a single wire has been strung. Connection will be made with the United Lines. C. L. Bly, of Boston, is setting a line of poles and stringing wires from Malden to Lynn, thus making a loop from the United Lines wires on the Newburyport turnpike.

At a recent hearing before the Boston Board of Aldermen, for permission to put incandescent wires under ground, the statement was made that there are at present 34 miles of incandescent light wires under ground in America. Mr. C. J. H. Woodbury, appearing in behalf of the insurance underwriters, stated that the insurance companies did not desire nor think it practical that arc light wires in view of the present unsettled state of underground work, should be buried beneath the surface of the streets.

The field for incandescent lighting is a very large one. A great quantity of water-power is now wasted or cannot for some reason be utilized for manufacturing purposes, and is, therefore, in the market at a very low figure. Wherever a town or village is situated near such water-power, the question of electric lighting for that place is solved. Some time ago Mr. Frank Ridlon, representing the Brush-Swan Electric Light Company, brought to the notice of the inhabitants of the town of Fairfield, Me., the possibility of employing a long unused mill privilege for the purpose of lighting the village. A company was formed, and a 300 light Brush-Swan 16 candle-power plant was installed. The dynamo is automatic, and adapts itself to the work required of it. The expense for power is so slight that the farmers in the village have discarded kerosene as an expensive and unsatisfactory illuminant. Nearly all the stores, dwellings and churches are now lighted by electricity, and the company is earning a large dividend. The town numbers about 3,000 inhabitants.

It has long been a question how theater lighting could be accomplished when lights are run in series. Any system of multiple series cut-outs will allow of lights being turned out by throwing into circuit equivalent resistance. But in this no provision is made for changing the candle-power of the lamps, as is so often required in theater lighting. It would appear that the desired result could be accomplished in the following manner. Each multiple of lamps may be connected with suitable resistance coils by means of switches. Through the resistance coils any portion of the current may be shunted. The lamps will receive all the current that does not go through the shunt. By increasing the amount of shunted current the brilliancy of the lamps can be decreased to any desired amount.

The Windsor Theater has for some time been lighted by arc and large incandescent lights, while gas was used for the footlights. An experiment will now be made to use incandescent lamps in multiple series for the stage lighting.

BOSTON, Mass., May 12th.

The Ball Electric Light Company, of 160 Broadway, has a capital stock of $500,000, and is organized to work throughout the whole United States.

EXECUTIVE COMMITTEE MEETING.

THE GOVERNING COMMITTEE OF THE NATIONAL ELECTRIC LIGHT ASSOCIATION SELECT AUGUST 31ST AS THE DATE OF THE DETROIT MEETING—PROGRAMME ARRANGED.

The sessions of the Executive Committee of the National Electric Light Association were held in one of the private club rooms of the Hotel Dam, commencing Tuesday afternoon at 4 o'clock. The members present were President J. F. Morrison, of Baltimore, member ex-officio; Chairman A. J. De Camp, of Philadelphia; Frank Ridlon, of Boston; Chas. Cooper, of Brooklyn; Eugene T. Lynch, jr., and Dr. Otto Moses, of New York. T. McCoubray, of Baltimore, Secretary. The electrical and daily press of the city was represented. Communications were read from all the absent members of the committee, explaining their absence.

The Committee on a Bureau of Electrical Information reported to the Executive Committee a plan of raising funds for carrying on the bureau by increasing the dues of the association. After some discussion, all members agreeing that this was a matter for the association to decide at its next meeting, it was decided to add the name of Dr. Moses to the committee, and on the request of Chairman Ridlon, his (Mr. Ridlon's) resignation as chairman was accepted, and Dr. Moses elected to that position.

This committee, as it now stands, is composed of the following-named gentlemen: Dr. Otto Moses, New York, chairman; Frank Ridlon, Boston; A. J. De Camp, Philadelphia; H. M. Cleveland, Hartford; J. A. Corby, St. Joseph; Geo. S. Bowen, Chicago; Chas. Cooper, Brooklyn; and Messrs. Goff, Martin and Price, New York. A report will be presented at the Detroit meeting.

August 31st, at noon, was decided upon as the date of the Detroit meeting, on motion of Mr. Lynch, who stated that, as the National Telephone Exchange Association met in St. Louis September 7th, it would oblige the associate members of the Electric Light Association if the two conventions were held on consecutive weeks.

The meeting adjourned until 10 o'clock, Wednesday morning.

In the session Wednesday forenoon, it was decided that all bills against the association would be paid on warrants drawn by the president and countersigned by the treasurer. The secretary was instructed to correspond with the chairmen of the various standing committees, asking them to report the progress they were making, in time for consideration at the next meeting of the Executive Committee.

On concluding arrangements for advertising the next convention, the committee adjourned to meet June 29th, at the Hotel Dam, New York, at 12 o'clock.

COMMITTEES.

The committees of the association, in addition to the Executive and Electrical Bureau committees, are composed of the following-named gentlemen:

Underground System — Protest Against Enforcement—E. R. Weeks, Kansas City; Chas. Cooper, Brooklyn; Frank Ridlon, Boston.

Legal Committee—Arthur Stewart, Baltimore; A. J. De Camp, Philadelphia; R. W. Pope, New York.

To Tabulate Rates for Public Lights Existing in Various Companies—H. W. Pope, New York; S. A. Duncan, Pittsburgh; J. F. Noonan, Paterson, N. J.

Standard Wire Gauge—Ralph W. Pope and Otto Moses, New York.

Relation of Parent Companies to Subcompanies—A. J. De Camp, Philadelphia; Eugene T. Lynch, Jr., New York; E. R. Weeks, Kansas City.

Transportation Committee—J. F. Noonan, Paterson, N. J., chairman; H. D. Stanley, Bridgeport, Conn.; James English, New Haven; L. M. Fishback, St. Louis; J. H. Yarbrough, Nashville; Geo. Wadsworth, Cleveland; S. A. Duncan, Pittsburgh.

A terrible cyclone visited Kansas City, Mo., on Tuesday of this week, killing twenty-four persons and blowing down a number of buildings. One of these buildings was a school house, and the little son of H. C. Sprague, superintendent of telegraph of the Kansas City, Fort Scott and Gulf Railway, was among the number killed. The telephone and telegraph wires in the track of the storm were blown dow, and one span of the railroad bridge across the Missouri river was blown into the water, carrying all the telegraph wires with it. The storm was the most disastrous to life and property that ever visited that section of the country.

Telephonic News

⁂ The annual meeting of the stock holders of the Erie Telephone Company, will be held at the Coleman House, New York, June 8.

⁂ The telephone will shortly be introduced into the English Law Courts, for the use of the gentlemen of the long robe and others having an official connection with the courts.

⁂ The telephone exchange at Wheeling, West Va., is to be connected by telephone with several eastern Ohio points, including Barnesville and Cambridge and intermediate points.

⁂ The finance committee of the Massachusetts legislature reported adversely on the bill providing for placing all telephone, elegraph and electric light wires underground, and the House adopted the report

⁂ The system hitherto in use at the Central Exchange of the Bengal Telephone Company is to be changed, and the magneto bell will take the place of the Law system throughout the company's exchanges.

⁂ The annual meetings of the telephone companies are being held quite generally this pleasant month of May, and those stockholders are truly happy who find the prospects for dividends during the year to come, to be among the substantial realities.

⁂ The Massachusett's House of Representatives has voted in favor of the bill restricting telephone charges to $4.00 per month for a subscriber who uses but one set of instruments, and $3.00 per month to subscribers who use more than one set.

⁂ At the annual meeting of the Rhode Island Telephone and Electric Company, of Providence, May 6, the old board was re-elected as follows: Jonathan Chace, Henry G. Russell, Henry Howard, Henry C. Cranston, J. Lewis Pierce, J. U. Starkweather, H. F. Barrows, F. H. Peckham, Jr., Rowland G. Hazard, J. W. Duxbury. The meeting then adjourned.

⁂ The Wallace Electric Manufacturing Company, which has been granted a franchise by the Indianapolis Council, has its headquarters in New York City, at 150 Broadway. In this system the battery is located at the central telephone office, with an automatic switchboard. Mr. Thomas Wallace, the inventor, is president of the company.

⁂ Mr. G. W. McNulty, civil engineer, and prominently identified with the construction of the Brooklyn bridge, has been appointed by President Vail as consulting engineer of the Metropolitan Telephone Company. His special work will be the question of placing the wires under ground.

⁂ Mr. A. B Uline, general manager of the Empire State Telephone Company, has adopted a most excellent plan for benefiting his Albany employes. A room has been set apart for the use of the regular employes as a club room, and the electrical publications and electrical books are kept there in convenient form. All who are entitled to the privilege are given a key to the room, and much valuable information is gained by making use of spare hours after work.

⁂ Lowell *Times:* A little girl, a neighbor of one of the members of the "telephone syndicate," ran into the house crying the other day. On being asked the cause of her distress, she sobbed out, "Jim Bennett kicked me!" The mother stared at her offspring with incredulity and amazement—feelings that were rapidly changed to wrath when the child insisted upon the truth of her story. "Do you mean Mr. Bennett who lives over on Branch street?" she inquired. "Oh, no, mamma," replied the little innocent, smiling through her tears, "it was Mr. Coburn's donkey!"

An Important Decision in a Telephone Case.

On May 6, Vice-Chancellor Bird filed an opinion at Trenton, N. J., in the case of the Domestic Telegraph and Telephone Co. of Newark, against the New York and New Jersey and Metropolitan Telephone Companies, by which the former company is given the right to renew its contract for five years for the use of the Bell telephones in Newark. The defendant companies will at once take the case to the Court of Errors and Appeals, the highest court in New Jersey.

The history of this case is an interesting one, and should the decision stand it will have an important bearing on the relations between several local companies and the American Bell Company. The Domestic Company secured a five year contract in September, 1879, which expired August 31, 1884, the contract being with the Bell Telephone, of New York. In 1882, the latter company assigned to the New York and New Jersey Telephone Company all its rights in New Jersey, except the Domestic, a provision being made for its transfer on the expiration of the five-year contract. The Domestic Company opposed this transfer, or merging, and has been fighting it for over a year, with the result above mentioned. There was a clause in this company's contract that mentioned a renewal and its terms, and they also claim that representatives of the Metropolitan (formerly the Bell of New York) promised a renewal. The case will be pushed to a final hearing.

A Spider-Web Telephone.

While a gentleman was watching some spiders, it occurred to him to try what effect a tuning-fork would have on the insects. He suspected that they would regard the sound just as they were in the habit of regarding the sound made by a fly. And sure enough they did. He selected a large, ugly spider that had been feasting on flies for two months. The spider was at one edge of its web. Sounding the fork, he touched a thread at the other side of the web, and watched the result. Mr. Spider had the buzzing sound conveyed to him over his telephone wires, but how was he to know on which particular wire the sound was traveling? He ran to the center of the web very quickly, and felt all around until he touched the thread against the other end of which the fork was sounding; then taking another thread along, just as a man would take an extra piece of rope, he ran out to the fork and sprang upon it. Then he retreated a little way and looked at the fork. He was puzzled. He had expected to find a buzzing fly. He got on the fork again and danced with delight. He had caught the sound of the fly, and it was music to him.

It is said that spiders are so fond of music that they will stop their spinning to listen, and a man once said that when he retired to his room for quiet before dinner and played the flute, large spiders would come onto the table and remain quite still, "running away as fast as their legs could carry them" directly he had finished.

The Telephone Girl.

"Hello, Charlie! What number do you want?"

It was the telephone girl in a suburban office that spoke. She sat in front of the solitary switchboard in the dingy little 7x11 room, and made her fingers fly as she moved the pegs from one hole to another.

"They're busy now, Charlie. Call when they are through. Hello! That'll do, George. What number do you want?"

"You know about all the subscribers?" asked the reporter.

"Know them! Bless you, yes; but I never saw—Hello, hello! Hundred and ninety-four on this wire—one of them, to my knowledge. Why, if I'd—Hello! You can have them now, Charlie—accept all the engagements they offer me, I'd go to the theater twenty-six times—Hello! All right, sir—a week, and spend all my Sundays at—Hello! Mr. Jones—picnics. Well, you know—What number do you want, Joe?—It don't make much difference if the girls do talk—Hello, Sam; quite well, thanks; who do you want?—a good deal to the boys; they never—Hello, Maggie; give me 457 on another wire; that one doesn't work well—see them, and if they do they don't know who they are. You see, we talk to these fellows twenty times a day, and do really get to know them, generally by their first names; but though, as I told you, we often have invitations to meet them, the telephone girls are mostly ladies, and very seldom 'mash' in that way, at any rate. Of course, some of the girls, who are not so particular do once in a while get acquainted with the subscribers, and I know of one or two cases which have been followed by wedding cards, but I don't think much of that kind of thing myself, and know about all the young gentlemen I care to."—*Chicago News.*

The New York Electric Club.

The New York Electric Club met at the Union Square Hotel, Saturday evening at 8 o'clock, President H. C. Davis presiding. Several communications were received from prominent electrical people assuring the club of their hearty support and endorsement. The names of T. L. Fowler and W. H. Kelley were added to the committee on constitution and by-laws, and the committee given until the next meeting to report.

It was decided to appoint a committee to invite gentlemen interested in all branches of the electrical field to be present at the next meeting, to be held at the same place, May 20th, at 8 o'clock, P. M.

The matter of the incorporation of the club and its scope was discussed favorably and at length by Messers. Davis, Stanley, Kelley, McTighe, Dam, Fowler, Barney, and others.

The officers of the club are the following named gentlemen:

President, H. C Davis; vice-presidents, John B. Powell, O. E. Madden, Geo. L. Beetle; recording secretary, Eugene T. Lynch, Jr.; corresponding secretary, Chas. W. Price; treasurer, Andrew J. Dam; custodian, H. B. Thayer.

Executive committee—Officers ex-officio, Eugene F. Phillips, Hugh R Garden, Henry C. Adams, Thomas L. Fowler, Henry D. Stanley, Willard L. Candee, Clark B. Hotchkiss, H L. Storke, Chas. Dutton, C. H. Barney, M. W. Goodyear, Ralph W. Pope, John W. Beane, E. T. Gilliland, Geo. G. Ward, F. W. Jones, W. C. Humestone, E. A. Leslie.

Telephone Experiments in France.

A Paris correspondent states that new and interesting telephonic experiments have just taken place between Paris and Rheims with the object of ascertaining whether persons provided with the telephone in Paris can correspond directly with telephone holders at Rheims. The distance separating Paris from Rheims is one hundred and seventy-two kilometers, but, including the length of the subterranean telephonic wires, the distance is two hundred and twenty kilometers. The lines serving for these experiments were two ordinary telegraphic wires, one of which was the Rheims wire, and the other the Berlin wire, which had been adapted to the public telephonic service organized between Paris and Rheims by means of M. Van Rysselberghe's anti inductive system. This system permits of telegraphic and telephonic despatches being simultaneously transmitted by the same wires without the slightest confusion, so that while telephoning was going on between Paris and Rheims the same wires were traversed by telegraphic despatches exchanged between Paris, Rheims, and Berlin. All the experiments were perfectly successful.

⁂ In December, 1884, the Baltimore and Ohio Telegraph Company applied to the Chesapeake and Potomac Telephone Company for an instrument to be placed in its office at Baltimore. It was refused on the ground that the Western Union Company has an exclusive contract, and that the telephone company holds its license in accordance with this contract. The Baltimore and Ohio Company applied to the courts for a mandamus to compel the telephone company to hire it an instrument, and on Monday last Judge Stewart, sitting in the Superior Court, gave as his opinion that the telephone company is a common carrier, and that under its present charter there can legally be no discrimination allowed. A writ of mandamus will be issued.

Indianapolis and Her Telephones.

THE CENTRAL UNION COMPANY STILL IN POSSESSION—A COMMITTEE'S REPORT ON NON-INFRINGERS.

The telephone situation in Indiana, and particularly in Indianapolis, continues to be interesting. The syndicate of local capitalists, who proposed to establish an exchange and operate under the West patents, if a suitable franchise could be obtained, have disbanded since the passage of an ordinance in their favor under which they could not operate, and the ordinance was amended by the Board of Aldermen by substituting the name of the Wallace Company for that of the West, and adding a clause forfeiting the privileges granted if any of the rights or privileges acquired under it should be assigned or transferred to the American, Bell or Central Union Companies, or telephones protected by the Bell patents be used, and in this shape the ordinance goes back to the councilmen for action on the amendments. The councilmen do not meet in regular session for two weeks, during which time the Wallace and the Cushman people, who expect to come in under the "Service line" clause, are kept in anxious suspense lest the friends of the West in council will defeat the ordinance entirely.

In the meantime the Board of Aldermen have reconsidered their action on the resolution ordering the removal of poles and wires of the Central Union, until another company is ready to establish a plant.

The Central Union has announced that it will, if permitted, furnish a public station service to its former patrons, and to others whose contracts as exchange subscribers expire June 30th, renting no telephones, but charging a message fee for each use of the instruments and lines, and it is said that there is a large demand for service of this kind from former patrons, but while the Board of Aldermen are willing to allow the lines to remain up, they will not consent that they shall be used in this way, and the Street Commissioner is directed to remove them from the streets if the company shall open additional stations. The demand of the public for telephonic facilities is, however, becoming stronger, and may result in changing this decision of the aldermen, unless some one of the various applicants for a franchise should show more conclusive proof of ability and willingness to give service within two or three months than has been offered heretofore.

The Aldermanic Committee examined the instruments of the various companies asking a franchise, with a view to "selecting a telephone that, in construction and methods of operation, is as much unlike the Bell as can be found," and in their report undertake to analyze the several instruments and pass upon their merits with the object stated in view, and decided upon the Wallace, principally for the reason that no induction coil is used in the transmitter and no permanent magnet in the receiver. The committee's report is too perfect a gem, from a scientific point of view, to be marred by cutting, and it is published in full:

INDIANAPOLIS, May, 3, 1886.

To the President and Members of the Board of Aldermen:

Your special committee, to whom was referred all matter relating to telephone matters, report as follows, to wit: An important question to the city at this time is, how can we best secure efficient telephone service? Your committee believe this question to be best answered by selecting a telephone that in its construction and the method of operation is as much unlike the Bell as can be found. To this end we have inquired into the mechanical construction of the Bell instrument, and compared all other instruments with it.

1. We find the Bell transmitter is a combination of the induction coil, with the platinum or other metallic point and carbon button so constructed as to cause the platinum point to vibrate against the button during use. The West uses the same factors, the carbon button, however, being set in a pendent, which, when talking, vibrates and strikes the platinum point. In the Bell the platinum point is held by a sensitive spring, which vibrates and strikes the carbon button.

2. The Bell receiver is a combination of a permanent magnet with a plate of iron or steel, which coils upon the end or ends of said magnets nearest it. [See Patent Reports 1877, pages 985-988]. By removing cap on Bell instrument this can be readily seen. The West receiver has all of the above factors—permanent magnets, the plate of iron or steel, and the coils of wire upon the ends of said magnets—all in combination and performing the same functions they do in the Bell

3. The Bell uses the induction coil in combination with the other factors mentioned in item 1 of this report, in their transmitters to accomplish two things: (1) To increase electric force on line; (2) to produce what "these telephone fellows" call the "induction of secondary current," which is used in the transmission of speech. The West uses the same features to produce the same result.

The West claims this one difference between their instrument and the Bell: That they "make and break" in their current of electricity, while the Bell, with the same combination of factors, claim the undulatory current. That they secure this difference by putting the carbon button in a swinging pendent, which "makes" when it strikes the platinum point, and "breaks" when it swings away from it. But the fact remains that the same factors in combination effect the same result in each. We find that in the Patent Reports of May 3, 1883, at page 865, that the pendent containing the carbon point to come in contact with the platinum is not novel in the West. The Baxter had same features, the only difference being that Baxter had a magnet at the bottom to assist in holding steady. West does not have this at the bottom, but near the center, but the two pendents vibrated and struck just the same. Baxter is enjoined by the Bell. The International telephone contains the same factors as the Bell, except that a carbon takes the place of the platinum in the transmitter. The Cushman people frankly say their instrument is the Bell, but claim priority of invention. The Brown has the combination in the receiver similar to the Bell—the permanent magnet opposite the diaphragm.

The Wallace telephone, simply as a machine, is unlike all these other instruments. The transmitter is nothing but two carbon sticks about one and one quarter inches long, fastened in the box, slightly apart, upon the top of which a weighted carbon the same length hangs loosely suspended by a wire, which swings from one to the other when talking in the same. It looks no more like the Bell transmitter than an engine looks like a passenger car.

The receiver of the Wallace is a complete half sphere, without any permanent magnet or coils as the Bell has, being simply a tin plate placed over the half sphere. As there is no induction coil about it, the primary current is used, and so far as this goes is unlike all others which use the induced or secondary current

Your committee, in this examination of the various telephones, has kept constantly in view the machine known as the Bell telephone, and have compared all others with it. We desired if we could to find a device, a machine unlike the Bell in its make up In this investigation we did not depend alone on our judgments but have called to our aid several practical men not connected with any telephone.

The result of it all is that we recommend the Wallace telephone as furthest removed from the Bell instrument, and believe it is the safest to rely on for telephone service in opposition to the Bell.

We recommend that Section 1 of General Order, No. —, 1885, be amended by striking out the names of the parties named therein, and insert the words "Citizens Co-operative Telephone Company."

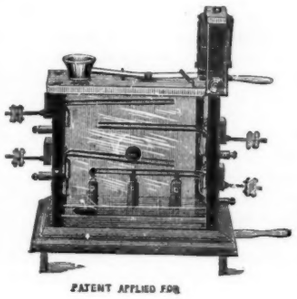
We further say that the claims of Dr. Cushman to priority of invention appear to your committee to be very strong. We do not think it proper for us to say that Indianapolis shall depend alone upon his ability to support his claims in the courts for telephone service, but with the Wallace to fight the Bell, on the ground that they have a different device, and Cushman to make the fight on priority of invention, we stand a double chance of getting good service and, if successful, have competition in the business. We recommend, therefore, that the Cushman Telephone Company, be given an ordinance to do business in the city.

The paper referring to removal of wires and poles of the Central Union Telephone Company, we report that it is for the best interest of the city to allow the wires to stand until the new company are ready to put up poles, and then, if the new company can not buy the poles, that they be at once removed to make room for the new company. The taking up and putting down poles in the business part of the city is a great inconvenience to business and ought to be avoided if possible.

If any attempt be made by the old company to establish toll stations hereafter they should be promptly removed by the Street Commissioner. Respectfully submitted.

JAMES A. PRITCHARD,
THOMAS E. ENDLY,
ISAAC KING.

It is not possible at this time to forecast the telephonic future in Indianapolis, but the mutterings of the storm of indignation now beginning to be heard at the trifling of companies and atmospheric syndicates with bogus telephones, and the action of the city authorities in prohibiting the public from having a service that is offered by the old company, and above all at the foolish act of the Legislature which caused the present chaotic condition of affairs, gives some promise that after the air has been purified by the display of electrical knowledge kept on tap for the past two months for the enlightenment (?) of the public, and the storm has passed, the sun will shine as brightly as before, and the "hello machines," used in Indiana, will still bear the legend "Property of the American Bell Telephone Co.," and be covered by patents a foot deep.



PATENT APPLIED FOR.

A New Invention for Automatic Lighting.

Mr. A. T. Smith, of this city, has invented a very convenient article in the shape of an automatic arrangement for completely illuminating a house instantly, and, as a guard against burglars, can be attached to the burglar alarm. A cut is shown on this page. A small brass case, 3 × 5 inches, with glass front, is fastened to the wall. Inside are several brass tongs; one for each part of the house to be lighted. A brass bullet is released when the circuit is closed, and, dropping upon the upper prong, the weight throws the prong on a pivot, which makes a connection and allows the bullet to roll to the next prong, and so on, and out at the bottom of the case.

The whole house can be illuminated at once, or any department desired, by hand, in place of the ordinary push button.

The instrument is intended principally for automatic gas burners, but can be used in connection with electric lighting if desired. It can also be used in connection with electric bells for simultaneously ringing them in schools, colleges, etc, where the bullet may be released by the clock.

.... The Central Court of the Edinburgh Exhibition is to be lighted by 1,500 incandescent lamps.

.... A chimney support for telegraph wires has been patented by Mr. Albert Potts, of Philadelphia, Pa. It consists of a frame clamped to the chimney top and supporting a short telegraph pole suitably braced, the frame and the pole carrying insulators for supporting the electrical conductors in the usual way.

.... A signal wire compensator has been patented by Mr. Clarke, of Manchester, with the object of keeping the wires of railway signals permanently tight. As the temperature increases the wire lengthens, and with ordinary apparatus the signal bars, instead of keeping the horizontal position, incline. This, which it is easy to see is highly dangerous in certain circumstances, is avoided by the use of Mr. Clarke's invention. No impediment is offered to the use of the levers as heretofore, but by means of a weight attached to the chain at the end of the signal wire, the wire is never slack. The apparatus has few additional working parts, and is, therefore, not liable to get out of order.

.... A permanent electrical staff is to be formed at Chatham Dockyard, where a certain number of the best fitters in the factory have been selected to be sent to Portsmouth yard for instruction in electrical work with the staff at that establishment.

.... The fire alarm telegraph, of Rochester, N. Y., now consists of seventy-five miles of wire, divided into eight circuits, all centering into one general office, at the Fire Department building, in Front street. This office is supplied with the latest improved apparatus and devices. The total number of fire alarm boxes is now ninety-three. During the past year four new boxes and five miles of wire together with twenty-five lightning protectors have been added to the system. The latter ensure safety from electrical currents so likely to breed danger to life and property. The contract with the Bell Telephone Company has enabled the city to transfer several miles of its fire alarm wire from the roofs of houses to the poles of that company. It is suggested that because of the rapid growth of the east side of the river, and the extent of the territory now practically unprotected, in case of fire, there is need of two more fire companies for that quarter of the city, one to be provided with a chemical engine and the other with a hose wagon.

....The plant of the Palmer Wire Company Palmer, Mass., which was purchased by J.S. Holden, the woolen manufacturer at that place, will soon be in operation, a company having been formed for that purpose. The new corporation will be called the Palmer Wire Manufacturing Company, of which H. P. & J. S. Holden are the principal owners, with H. P. Holden as manager. The mill will manufacture mattress, broom pin, and other fine wires. Considerable new machinery will be added at once. It is intended to have the mill in full operation by June.

.... The Western Union Telegraph Company has announced a reduction, taking effect May 1, in rates between offices in Arkansas and those in North Carolina, Georgia, Alabama, Minnesota, Louisiana and Wisconsin of 50 to 40 cents, equal to 20 per cent; also between offices in Texas and those in Dakota, Wyoming, Colorado, New Mexico, Utah, Idaho, Montana, Arizona, Nebraska, California, Oregon and Washington reduced from 75 to 50 cents, equal to 33⅓ per cent.; also between offices in Kansas and those in New York, Pennsylvania, Delaware, District of Columbia, New Jersey and Virginia from $1 to 75 cents, equal to 25 per cent. reduction. These rates are made mostly between points where there are no competing lines.

.... At a recent meeting of the Royal Dublin Society Mr. Howard Grubb, F.R.S., described his new design of observatory for monster telescopes. The design was made at a request of the Lick trustees; but Mr. Grubb has gone beyond the conditions, and not only enables the observer with the 3-foot o.g. and 70-foot dome to turn the latter, and point the equatoreal with as much ease as one can manipulate a table microscope, but he dispenses with the ordinary services of an assistant by providing the astronomer with means to raise himself to the eye end of the instrument, which, in the case of the Lick telescope, may be when in the horizontal position 30 feet from the floor. Mr. Grubb illustrated this and all the other required motions by a working model, in which the water-power was replaced by clockwork. Standing away from the model in another part of the room, and connected only by an electric cable, he showed that he had complete control over all the motions of the telescope, dome, and floor; and he explained that, so far as the electric control was concerned, the same apparatus used for the model would be amply sufficient to guide and govern the movements of this great instrument and dome—the latter weighing some 70 tons. The restrictions laid down by the trustees of the Lick Observatory will, unless modified, prevent the possibility of Mr. Grubb's design being carried out, however. It would appear that in the case of the dome, on which some £3,000 to £4,000 of wages would have to be expended, the entire time available, according to the terms laid down and allowing for the necessary delays in transmission and erection, would only amount to five or six weeks, and Mr. Grubb expresses his inability to undertake it in that time.

TELEGRAPHIC

.... The plant of the St. Louis Wire Mill Company, is to be removed to Rankin Station, near Pittsburgh. Works will be erected at once, called the Braddock Wire Works. The establishment will give employment to 400 men.

... The Consolidated Railway Telephone and Signal Company at Chicago has filed articles of incorporation at Springfield. The capital stock is $5,000,000; incorporators, William Vogel, Fred. H. Binder and Edgar B. Tolman.

..... The Lowell Wire Works corporation has been organized with the following officers: President, William J. Coughlin; Treasurer, William J. Coughlin; Directors, William J. Coughlin, John J. Kerwin, Joseph Lyman. Capital stock $20,000; paid in $2,000 cash, and $18,000 in patents and merchandise.

.... Hon. J. C. Greeley and Captains Holmes and Spencer have leased the St. Johns Bar Telegraph Line, which extends from Jacksonville, Fla., to Fort George Island, for a period of ten years. They intend to put this line in first-class condition and will in the future keep it up and operate it in a business-like manner.

.... Preliminary steps have been taken for the formation of a district telegraph company in Lynn, Mass, Messrs. Charles P. Mudge, James T. Lennox, Edward Heffernan being the originators. Some 200 subscribers have been obtained. An office on Central avenue has been secured. The enterprise calls for the expenditure of $10,000.

.... The Joint Committees on Streets and Ordinances of the Detroit City Council met May 6, in the afternoon, in the Council Chamber, to act upon the resolution of the lower house, permitting the Inter State Telegraph Construction Company to erect poles and train wires on certain streets and alleys within a mile of the City Hall. Councilman Champion moved to concur in the action of the Board of Aldermen, and after some little debate the motion prevailed by a unanimous vote.

.... M. Granet, Minister of Posts and Telegraphs of France, has granted a charter to a French company to lay a new cable between Brest and New York, *via* Guadeloupe. The State guarantees a portion of the capital on condition that the cable be manufactured in France and be laid by French vessels. The charter requires the sanction of the French Parliament.

.... By a telegraph operator's error, two passenger trains, bound in opposite directions, met on the railroad near Colton, California, last Wednesday. Fortunately the engineers were on the alert, and by the use of the air brakes the trains were stopped, leaving a distance of but six feet between the two cow-catchers. It was a very narrow escape from a frightful accident.

.... Probably never in the history of Pittsburgh has the output of steel and iron been so great as at present. The pipe mills there are all busy, and prices of pipe are firm but unchanged. Manufacturers are refusing to contract for future delivery at present prices. They will book orders with the understanding that whatever the rates at the time of delivery are to be changed.

.... The Parish Brothers & Peck Electrical Company have filed articles of incorporation, fixing the capital stock at $1,000,000, divided into 40,000 shares. The incorporation intends to manufacture, buy, and sell electrical appliances, and doing all business incidental thereto in the city of Detroit Hiram B. Peck, of Allegan, Mich., holds 13,333 shares, William F. Edwards, 6,667, Moses F. Parish 10,000, and Myron W. Parish 10,000 shares.

ELECTRICAL AND SCIENTIFIC

* * The city of Jacksonville, Florida, has decided to put in a complete fire-alarm system. J. F. Morrison, of Baltimore, closed the contract with the city authorities. The system will be Gamewell's.

* * The Nahant townspeople favor the idea of an electric railway from Lynn, which will not interfere with their magnificent beach avenue drive. The selectmen of the town have made arrangements to have a boat run to and from Boston this summer.

* * A Frenchman has found means to restore the life-like expression to the eyes of dead persons. He places a few drops of glycerine and water in the corners of the eyes and the effect is said to be startling, so life-like do the eyes become.

* * In a cannon foundry at Bourges, France, electricity has been successfully applied to mechanical purposes for more than five years, two large movable cranes, each weighing over twenty tons, having been worked by electric motors without difficulty.

* * The latest invention is a sewing machine which upon being operated plays a succession of lively tunes. What the country needs is a piano, which, upon, upon being played, will sew up a succession of shirts and other useful wearing apparel for the household.

* * The Norristown *Herald* says: "While a London chemist was testing a bottle of milk it exploded with a loud report, scattering fragments of glass all over the room. Professor Huxley's theory is that the cow had been eating dynamite, but we think his hypothesis is wrong. A more plausible explanation is that some fiend had thrown nitro-glycerine into the well.

* * A comical incident is related of an eminent English nobleman who was presiding at a press dinner. He concluded his few feeble remarks by proposing the "health of Guttenberg." Some one pulled his coat tails and whispered that he was dead. "I regret," continued the nobleman, "to announce that intelligence has just been received that Guttenberg is dead."

* * A bill has been filed in the United States Circuit Court at Chicago, by the American Bell Telephone Company against the Inter-State Telephone Company, operating the Hopkin's patents. The chief stockholder is said to be Charles Whitlock, who was once one of the originators of the People's Telephone and Telegraph Company, and as such was enjoined from infringing the Bell patents.

* * The new departure in journalism, *Public Opinion*, published in Washington, D. C., is winning a prominent and honorable position. The opinion of the publications of this country on recent and important topics are presented in classified and convenient form. A fortnight ago the editor of *Opinion* sent the question, "What is the proper relation of the pulpit to the labor problem" to two hundred leading clergyman of all denominations with a request for their views. A very large number responded, and the opinion, thus expressed appeared in last week's issue of *Public Opinion*. They make interesting reading at this time.

* * A citizen of St. Louis, Jay Noble by name, is said to have invented an engine which receives its power from gas from coal oil. The oil is in a tank in the roof of the car, the gas being generated as used, the flash of the explosion as it passes into the cylinder heats the air, producing expansion. The only difficulty, so far, has appeared to be the nervousness of the general public in riding on or near a car carrying oil, but it is claimed that there would be no danger whatever. Mr. Noble claims that he can furnish power for a ten horse-power engine, which would pull three or four cars, at a cost of $1 a day, the engine working noiselessly. The engine would occupy no more space than the lever in a grip car.

* * It is now claimed that the climate of California is especilly favorable for the manufacture of violins. It has an effect on resonant woods that enhances the value of the instruments into which it enters. A leading violin-maker is so convinced of the truth of this theory that he has permanently located in San Francisco. California will now receive full punishment for all her misdeeds.

* * The paper read before the National Electric Light Convention held in Baltimore last February, by Mr. A. F. Upton, general manager of the Jarvis Engineering Company, of Boston, on the Transmission of Power by Electricity, attracted the attention of the electric light companies, and has resulted in the application of this system by the following companies: The Illuminating Company, New Bedford, Mass.; Milford Electric Light and Power Company, Taunton Electric Light Company and the Illuminating Company, of Boston.

* * A valuable discovery has been made, whereby the faded ink on old parchments may be so restored as to render the writing perfectly legible. The process consists in moistening the paper with water, and then passing over the lines in writing a brush which has been wet in a solution of ammonia. The writing will immediately appear quite dark in color; and this color, in the case of parchment, it will preserve. On paper, however, the color gradually fades again; but it may be restored at pleasure by the application of the sulphide. The explanation of the action of this substance is very simple. The iron which enters into the composition of the ink is transformed by the reaction into the black sulphide.

* * Dr. De Bausset, the gentleman who has been for several years attempting to solve the problem of aerial navigation, has just made a practical test that is of considerable note to the public. The plan is to build a steel cylinder 270 feet long and 75 feet in diameter, with a 90-foot cone at each end, the entire length being 450 feet. Beneath this cylinder it is proposed to suspend a car which will be some 120 feet long and carry the motor and a large number of passengers. The inflation process will be dispensed with, and the cylinder will be almost a complete vacuum. He proposes to use electricity as a motor, and expects to attain a speed of 15 to 20 miles an hour near the earth's surface, and 45 to 60 miles per hour at an altitude of 8,000 feet. To accomplish this he will use dynamo-electric motors, which rotate 12 screws and displace 300,000 cubic feet of air per minute. The cylinder is to be built of steel plates 24 inches long and 10 inches wide. The experiment was made to test the practical strength of the plates. This was done by putting a plate in such a position in a frame that had been arranged that the entire weight would rest upon the steel. The doctor put 2,400 pounds of iron upon the steel plate, which was more than his figures had shown it would withstand. The plate proved itself of sufficient strength to hold the load. He will test it with hydraulic pressure. The cylinder will be a vacuum to three-quarters, one-quarter being reserved to counteract the atmospheric pressure of 3.66 pounds. To raise the aero-plane, with the car attached, the machinery, and 200 persons, the pressure is 8.55 pounds, giving a margin of 80 tons of air in reserve in the cylinder to carry merchandise. With the 80 tons of air displaced, the atmospheric pressure will be 11 pounds.

* * Mr. Leo Ehrlich, of St. Louis, is said to have invented an electrical stamp, to take the place of the hand-stamp used in the post offices for stamping mail and canceling stamps. It consists of a handle, to which is attached a plate composed of a non-conducting composition, on which is engraved the letters and cancel-mark desired. In these lines is laid a thin platinum or iridium wire, which is held in the form of the letters by a wire thread looped over it like the stitch of a sewing-machine. When an electric current is passed through the letters they become heated to a red heat, and it needs but a momentary application to a letter or postal card or any other combustible material to brand it indelibly. Mr. Ehrlich has applied the principle to a type-writer, and can write a note to any one with electricity.

The Weston Electric Light in England.

On Wednesday evening, the 21st inst, a number of invited visitors called at the South Belgravia residence of Mr. Hugh Watt, M. P., for the purpose of seeing his electric light installation. The system adopted by Mr. Watt is that of Mr. Edward Weston, electrician of the United States Electric Lighting Company. It is as yet comparatively little known in this country, but in the United States it shares public patronage equally with that of Mr. Edison. The motive power was derived on Wednesday night from a two horse-power gas engine which drove the dynamo at a speed of 1,500 revolutions per minute. The engine and dynamo are fitted up in the basement of the house. The engine worked very regularly, and no unsteadiness in the light was noticeable throughout the evening. The lamps used by Mr. Watt are all of the 16 candle power zig-zag type, the filament being made either of paper or of a material prepared in the Weston laboratory and named tamidine. The fittings were very varied, showing beautifully the degree of skilled workmanship and fine ornamentation of which these matters are susceptible. Every apartment of the house—basement, corridors, bedrooms, etc.—was appropriately lit up. When required one, any or any number of the lamps could be switched off or on without perceptibly affecting the brilliancy of the others. This is due to the peculiar construction of the Weston incandescence dynamo, by which a constant difference of potential is maintained at the terminals, despite all variations in the number of lamps fed by the machine. Of course these are arranged in parallel circuit. The quality of the light emitted by the incandescent filaments was tested by its effects on paintings, tapestry, and flowers, as well as on the many-colored evening dresses worn by the ladies.—*London Engineering.*

Telephone Affairs in Mexico.

The annual report of the Mexican Telephone Company for the year ended April 30, 1886, contains, besides the usual financial exhibit, the report of General Manager Guiraud, embracing a number of impor ant contracts entered into during the year. Treasurer Reed's report says: The past year has been one of great depression in commercial circles in Mexico, and consequently retarded the increase of this company's business; nevertheless, the management have, by retrenchment and economy, been able to render what they consider a very satisfactory statement. The net operations to date show a surplus of $10,113.36 and had it not been for the outlay in sub-companies absorbed to put them into earning position (the Puebla Company alone requiring $5,169.25), this company would have been in condition to pay a dividend out of the past year's earnings. The debt of the company is very small, and the quick assets very much in excess of said debt. Following are the receipts and disbursements, also trial balance of company's books to date, and profit and loss account:

RECEIPTS.

March 1, balance on hand	$ 918 25
Remittances from M. L. Guiraud	2,336 25
Loans	3,065 56
Royalties	3,269 40
Total	$ 9,589 46

PAYMENTS.

Accounts paid	$ 6,998 51
Supplies	1,223 29
Expense account	882 21
Interest	101 33
West'n Elec. Co. on acc. Puebla Co.	296 49
Total	$ 9,501 83
Balance on hand Mar. 1, 1886	87 63

PROFIT AND LOSS ACCOUNT.

Cr.

Private line receipts	$ 1,159 82
Supply sales	59 69
Rentals	74,955 80
Total	$75,275 31
Interest account	$ 1,630 84
General operating account	24,350 06
General expense account	20,982 38
Salary and rent	18,198 70
Total	$65,161 95
Surplus	10,113 36

The company's bills payable are only about $2,100, and are more than offset by credits. The rentals in 1885 were $40,829.93, a gain of $11,756.20 over 1884. The instruments in service March 1, 1886, were 671 in Mexico City, 160 in Guadelajara and 78 in Puebla, a total of 909, and an increase of 144 for the year. The Federal Government has ceded to the states local telegraph lines, and contracts are now under study to maintain these lines and replace, as much as possible, telegraph by telephones in both the States of Jalisco and Puebla. The Mexican Telephone Company has contracted with the Federal Government to build twenty-six lines for a rental of $250 per month, the Government to furnish material and the company to erect the lines and furnish instruments. At the end of two years, the Government has the option to buy the telephones at $80 per instrument and pay $100 per month to the company for maintenance, or to pay $200 per month rental. A contract has also been made with the Secretary of Public Works, whereby telegraph wires are to be run on the company's poles, and the company in return has free telegraph service on all lines The company has purchased for a nominal sum certain concessions from Messrs. Islas and Wiley, and, as a sequence to this, has obtained a new contract from the City Council of Mexico, giving the company the right to erect poles in the city of Mexico for five years, carrying the right to construct advertising poles on the street corners, and other valuable privileges. As an offset, the company pays a tax of 15 cents per pole per month. The management considers the company strongly intrenched and its prospects good. Manager Guiraud says he can send $1,000 per month profit to the Boston office. It has been no small task to bring the property to its present condition. Messrs. Reed and Guiraud have carried the burden of this labor.

Birds Killed by an Electric Light.

A strange phenomenon occurred in the storm of Saturday night at the Board of Trade tower light, Chicago. This is an immense light, and when the watchman made his rounds on Monday, he found the sidewalks and streets in front of the tower fairly covered with dead birds of all sorts. A little later the electrician went up to the lantern with several members of the Board of Trade. The roof was found to be covered with dead birds, and each of the lamps in the big circle of light was filled with them, one globe having eight birds in it. These birds are of every known variety and many unknown, or rather unfamiliar, species are in the lot. All shades and colors are there, scarlet, blue, pink, red, canary, mottled, black and white, and there were some snipe and plover among them. The theory is that they were migratory flocks, going from south to north, and were attracted by the great light.

—— The Citizens' Electric Light and Power Company, of Newcastle, Pa., has been organized with a capital of $17,500. Treasurer, Roy S. Foltz, of Newcastle.

—— The Consumers' Electric Light and Power Company, Aspen, Col., has been organized with a capital of $50,000. David R. C. Brown and others, incorporators.

—— The Canon-Thomson-Houston Electric Company, Canon City, Col., has been organized with capital stock $48,000. S. R. Dewey and others, incorporators.

—— The Waupaca Electric Light Association, Waupaca, Mo., has a capital stock of $10,000. Charles Churchill and others, incorporators.

—— A tall pole was erected in Getty square, Yonkers, last week, upon the top of which will be placed several electric lights for lighting up that locality at night.

History of Electric Lighting in San Francisco.

One of the first local companies organized in this country for the purpose of engaging in the business of electric lighting from a central station was the California Electric Light Company, of San Francisco. It adopted the Brush system, and was incorporated as early as June, 1879; at once set about erecting a central depot, and by September of the same year was furnishing electric lights to subscribers about the city at a good round rental of $10 a week for each light, burning from dark until midnight. Since then, however, the price has been reduced half a dozen different times.

In addition to San Francisco, the company has the agency for all the rest of the Pacific coast, and has established lighting stations at other points. The Los Angeles and the San Jose stations are very fine ones, both cities being entirely lighted by electricity.

The history of the company will be interesting to Eastern electricians. It was a pioneer, and it had to learn many things by experience. After having run five months, and reaching a capacity of fifty lights (the limits of the station), the works were destroyed by fire on April 24, 1880. There being no insurance, there were no "adjusters" to waste time over, and the company immediately secured another site upon a five years' lease, and within thirty days had a brick station erected and all the apparatus prepared and again running. Within two years, the business of the company had grown beyond the capacity of their works, when they moved to the present site, this time purchasing the property and erecting a plant with a capacity of 400 lights, which in turn became too small, and they were necessitated to purchase the adjoining property, and have thus erected thereon a substantial brick building, with a smoke-stack 150 feet high, six feet inside diameter. Their present building is 85 by 130 feet and two stories high, and is situated at Nos 222 to 232 Jessie street.

The motive power is supplied by two Corliss engines, both exactly alike in all respects, and either of them sufficient for the force required for the entire works. They are splendid specimens of mechanical skill, and work with perfect smoothness. The bed plates are enormous and massive, and are firmly secured to the concrete foundation. They are each 500 horse-power. The fly-wheels are twenty-two feet diameter, and weigh sixteen tons; they are run at seventy revolutions per minute. The belts are thirty-six inches wide, double belts of the best California oak leather, aggregating 250 feet. The two engines weigh eighty-three tons. The engines are connected to a line of steel shafting, in such a manner that one or both engines can be run as may be desired. This shafting revolves at the rate of 300 revolutions a minute, and is belted direct to the dynamos in such a manner that any machine can be disconnected without disturbing the rest. This is accomplished by a unique device, which is highly spoken of. There is no friction or wearing surface. When the disc is telescoped, the machine starts; when thrown out, it stops. The action is positive, and it is claimed to be a most perfect device invented for stopping and starting electric light machines. H. P. Christie is patentee. The station in other particulars is equipped with apparently every possible device for convenience and safety, the switch-board being so arranged that any circuit can be changed to any machine without making a perceptible flicker in the lights, and throughout the building are six fire-hose attachments connected to the city water mains, by which a stream of water can be turned on any part of the building with 65 pounds' pressure, at a moment's notice.

San Francisco is about the only city in America of its size that is not considerably lighted by electricity. It would seem a good business proposition for the city fathers to adopt the electric light for some considerable portion of San Francisco, aside from the fact that it would be giving a fitting encouragement to the enterprise of the gentlemen that boldly put their money into the electric light business in this city before it was in use elsewhere, says the *Journal of Commerce* of that city. In one locality especially is the light badly needed. The city front is infested with thieves and garroters, who seem to sleep all day and ply their nefarious business at night. Officers of vessels at the wharves are often afraid to return to their ships at night alone, and are sometimes compelled to remain up-town. The Harbor Commission pays in a very large sum monthly to the State Treasury. Port charges are said to be higher than anywhere else in the world. Why, then, with high charges and plenty of money, is not the city front lighted up? Why, with high charges, does not the city also furnish good facilities for safety as far as light is concerned? Montreal, a city with only a fractional part of the shipping of San Francisco, has six miles of docks lighted by electricity. New Orleans has 100 electric lights on the levee. In New York no streets are better lighted than those fronting on the wharves, and it is, perhaps, not too much to say that nowhere is life and property safer. As was stated in the REVIEW last November, "the electric light has proved too strong for the weak eyes of the 'water rat,' and the burglar burgles no more; or, if he is yet at the business, he has found other and more congenial haunts, where the 'mellow glow' and bad smell of the gas company's product make things comfortable for the burglar as as well as for the burglaree—if such a term may be applied to a citizen whose house is being quietly robbed. But to do any 'cracking' under the full glow of an electric arc light is dangerous, as well as an uncongenial business, even to a river thief, who is somewhat fastidious as to his surroundings. In truth, he might as well notify the police department of his intentions, and be done with it." The State Harbor Commissioners of San Francisco should see that the city front is put in first-class condition, and the electric light should be extensively adopted to secure this desired state. It rents only 56 lights for public purposes, but the company now furnishes 468 lights to subscribers, and the number is constantly increasing. Mr. George H. Roe, the manager, says that the business has heretofore outgrown the capacity very often, but that the present enlargement gives a plant equal to the needs of San Francisco for many years to come. With the old and new stations, the company has a capacity of 1,400 lights.

—— E. Mather, agent for the Jarvis patent furnace in Pennsylvania, has just completed the setting of a tubular boiler for the Electric Light Company, of Lebanon.

—— The Bridgeport Electric Light and Power Company, Bridgeport, has put in an Armington & Sims Company high speed engine. This makes the third engine of this make the company has put in.

—— The Foundry and Machine Department of the Harrisburg Car Manufacturing Company, M. E. Hershey superintendent, is securing a splendid patronage from electric light companies for the Ide automatic engine. Four of these engines are being used by the incandescent electric light company in Reading, Pa., one of 80 horse-power, two of 100 horse-power and one of 150 horse-power. The City Council of Easton, Pa., has contracted for the Ide machine, for the arc-light plant that the Western Electric Company is putting in, two 60 horse-power engines representing the power required. In addition to the above, the Harrisburg manufacturers have on their books the following orders: One of 50 horse-power for the Pittsburgh Tube Company for electric lighting; one of 30 horse-power for Mustin & Co., of Philadelphia; one of 50 horse-power for the McHose Firebrick Works, of Reading, Pa.; one of 50 horse-power for the Bethlehem Silk Mill; one 30 horse power for the Peerless Manufacturing Company, of Louisville, Ky.; one 50 horse-power for P. M. Walker & Co., of Loogootee, Ind.; one 30 horse-power for P. B. Bucher & Bro., Lime Rock, Pa., and one 250 horse-power for Atkins & Co., of Indianapolis, Ind.; also one of 150 horse-power for the Harrisburg Manufacturing Company.

—— The city of Grand Forks, Dakota, is now lighted by electricity, and feels proud of its progress.

—— The number ofarc lights put in during the year by the Schuyler Electric Light Co. is 2,565, one thousand more than was stated in our last issue, through an error of the type.

—— In Topeka, Kansas, the incandescent electric light seems to be taking the place of gas quite extensively. This satisfactory illuminant is now used by the daily *Commonwealth*, Windsor Hotel, Shawnee Mills, Crosby Bros., Clements & Chaffee, and Taft & Curdy.

—— The electric light station of Mr. J. F. Llewellyn, at Mexico, Mo., which was burned down April 8, was rebuilt and running by May 5, notwithstanding the loss of four days through bad weather. The new building is of brick. The energy of Mr. Llewellyn, and the promptness of the Schuyler Company in sending new apparatus, were features deserving praise, and have greatly pleased the citizens of Mexico.

—— In his annual message Mayor Parsons, of Rochester, N. Y., spoke of the street lights, and said: "There is no expense, however, which taxpayers are called upon to meet that is more willingly borne than the expense incident to street lighting. This statement is only true, however, when value is received for money expended. I think the electric lights are giving good satisfaction, and the prices we are paying for gas are not exorbitant. The contracts with gas companies expire the coming summer, and doubtless the question and terms of their renewal will soon engage your attention. The kerosene lamps are an unmitigated humbug, and, in my opinion, at least two-thirds of the amount expended for maintaining them is money thrown away. I trust that in the very near future we shall be able to discard them entirely."

—— The following chemical process for making carbon filaments for incandescent lamps is described by Mr. A. Smith in *Dingler's Polytechnisches Journal*, 257, 338. Hydrogen chloride is passed through furfuraldehyde, or fucusaldehyde, and a black liquid is obtained that is placed between two glass plates. From this liquid a thin layer of carbon separates after eight or ten hours, and the thickness of the layer is regulated by inserting wires between the plates. This layer is removed, cut into strips, and twisted, and heated to 100 degrees Cent. Afterward, these filaments are heated in closed crucibles, through which a current of marsh-gas is passed. Their electric resistance can be changed by the addition of 2½ per cent. of lamp-black to the furfuraldehyde. For the preparation of carbon rods for arc lamps, finely powdered carbon is mixed with from 60 to 70 per cent. of furfuraldehyde, and the mixture subjected to powerful pressure in suitable molds. The rods thus formed are exposed to the action of gaseous hydrogen chloride, after which they are highly heated in closed crucibles covered with powdered carbon.

—— The Westinghouse Electric Company are establishing the new plants in Trenton, N. J. They have erected a large two-story building in the center of the block bounded by State, Greene, Front and Warren streets, and have already placed boilers of 300 horse-power capacity in it. It was thought at first that this would be sufficient, but the subscribers have increased so rapidly that they now propose to enlarge the building, and place in it just double the present boiler capacity. This will enable them to reach any part of the city where their custom demands. Enough customers have been secured already to utilize three-fourths of their present power, and they are rapidly increasing. They expect to put as many as 5,000 lights into use before long. In this station there will be six dynamos at first, and when enlarged twelve, which will operate day and night. As soon as the plant is in working order, the control of the business passes from the Westinghouse Company to the Trenton Light and Power Company, who operate the arc light system. Besides the station mentioned, the company purpose enlarging the arc light station on the other side of the Assanpink Creek, and establish an incandescent plant there with capacity for from 1,000 to 1,800 lights. Thus nearly the entire city will be covered.

ELECTRIC LIGHT NEWS

—— The Peoples' Electric Light Company of New York, Pa., has been organized with a capital of $25,000.

—— Queen Victoria has ordered that Buckingham Palace be lighted with electricity.

—— Electric lights have been placed in the room of the Senate Committee on Patents, the gas used filling the room with smoke, and vitiating the atmosphere.

—— The Electric Illuminating Company, of Altoona, Pa., with a capital stock of $40,000, has been organized. Treasurer, John Lloyd, Altoona.

—— The Electric Light and Power Company, of Amsterdam, N. Y., with a capital stock of $50,000, has been organized. James Hurst and others, incorporators.

—— The Holyoke Electric Light Company has seven dynamos, with a lighting capacity of 190 lights. The plant has a magnificent Buckeye engine of 375 horse-power.

—— The Electric Light Company, of Bay Ridge, Md., has purchased a 30-arc light and 40-light incandescent plant of the Schuyler Company, through Mr. Stephen Holbrooke, their energetic Philadelphia agent.

—— The Springfield electric light plant has in use two magnificent Harris-Corliss engines of 125 horse-power each, and also a 75 horse-power Buckeye engine, which alternately, as the demand may require, run the dynamos with the aid of countershafting.

—— The Middlesex Electric Light Company, of Lowell, has bought the plant of the consolidated Thomson-Houston and Sawyer-Mann incandescent light companies for the city of Lowell, and will run wires at once for supplying between 200 and 300 lights already ordered in that city.

—— The Indianapolis State House Commissioners are considering a number of bids, opened this week, for electric light and gas fixtures for the capitol. There were nine bids in all, ranging from $30,000 to $40,000. It will take ten days to examine the bids, make calculations and determine which is the lowest. Most of the bids are from foreign firms.

—— In Philadelphia the city now pays for 344 electric lights at the rate of fifty-four cents each per night, and when the eight on North Broad street are put up, the number will be increased to 352. Six companies do the lighting, the Brush having 155 lamps; the United States, 135; the Northern, 16; the Philadelphia, 14, the Germantown, 14, and the Frankford Company, 10. The contracts between the city and the companies require that each lamp shall burn for eight hours, and when a light goes out sooner the company is compelled to make a proportionate reduction in its bill.

—— At the last meeting of the light committee, of the Montreal, Canada, Council, the chairman read a communication from the Canadian Electric Light Company, stating that they could not enter into any contract for a term less than twenty-five years. The report of Superintendent Badger was then read, in which he gave particulars of the various tenders for electric lighting. His report was in favor of the Royal Company. It was resolved, on motion of Alderman White, seconded by Alderman Prefontaine, that, owing to changed conditions due to the withdrawal of the Canadian Electric Company's tender, the report be referred back to the sub-committee, and that the committee be continued in order to get a definite and substantive proposition from the Royal to light certain portions of the city, said report to be ready for the first meeting of the council.

ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING MAY 4, 1886.

341,000 Telephone receiver; James T. Guthrie, Leesburg, Ohio.
341,058 Switch for electric railways; William M. Schlesinger, Philadelphia, Pa.
341,059 Electric light system; William M. Schlesinger, Philadelphia, Pa.
341,110 Electric time system for telephone lines; James S. Ross, Nashville, Tenn.
341,111 Electric synchronizing mechanism for clocks; James S. Ross, Nashville, Tenn.
341,114 Fire alarm telegraph; John C. Wilson, Boston, Mass.
341,115 District, or fire alarm telegraph; John C. Wilson, Boston, Mass.
341,128 Electrical connection; George D. Burton, Boston, Mass.
341,259 Telephonic receiver and circuit; Wm. Marshall, New York, N. Y.
341,263 Telephone transmitter; Jas. F. McLaughlin, Philadelphia, Pa.
341,264 Telephone transmitter; Jas. F. McLaughlin, Philadelphia, Pa.
341,267 Recording and reproducing sounds; Sumner Tainter, Washington, D. C.
341,268 Apparatus for recording and reproducing sounds; Sumner Tainter, Washington, D. C.
341,269 Safety device for electric wires; Edwin B. Temple, Everett, assignor to the American Bell Telephone Company, Boston, Mass.
341,303 Steam dynamo-electric machine; Leonidas G. Wooley, Indianapolis, Ind., assignor to Henry H. McGaffey and Chester Bradford, both of same place.
341,368 Electric steam governor; Edw. H. Amet, Chicago, Ill., assignor to H. A. Streeter, same place.
341,370 Magneto-telephonic apparatus; Fred. H. Brown, Fort Worth, Texas.
341,384 Electric cut-out; Adam Lungen, New York, N. Y., assignor to Edwards & Co., same place.

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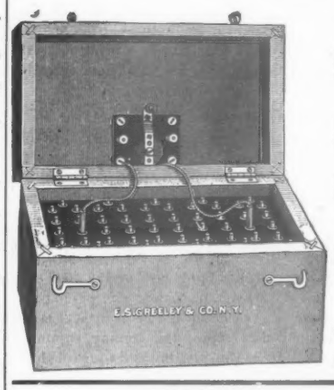

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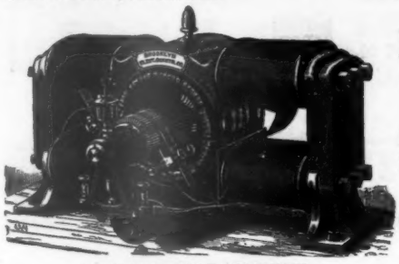

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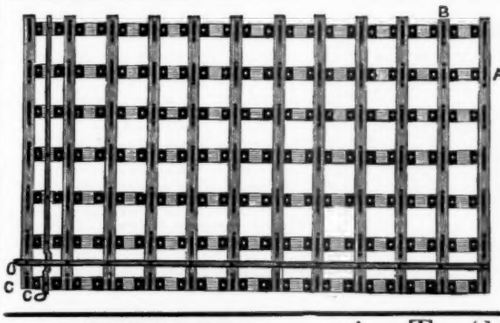

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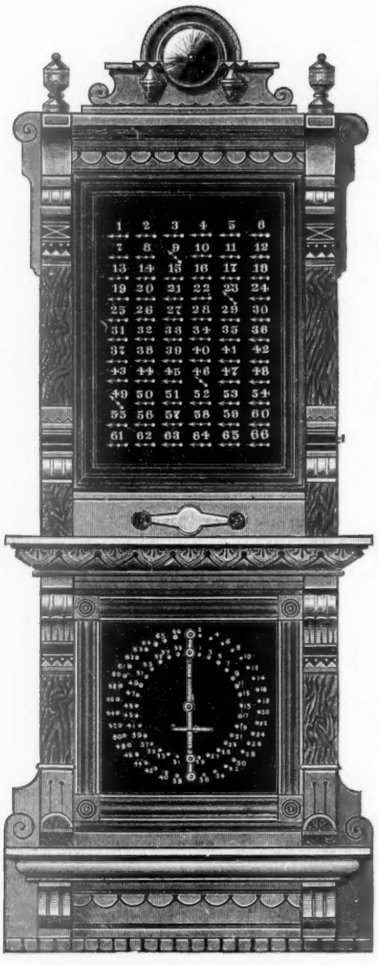

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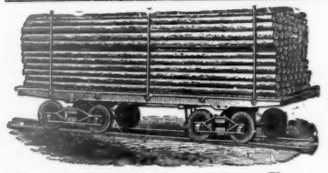

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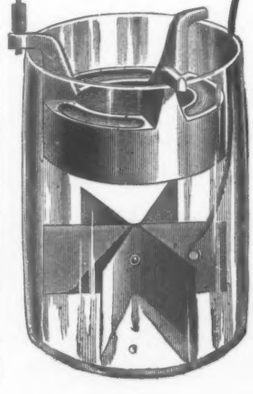

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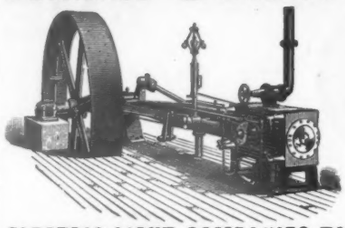

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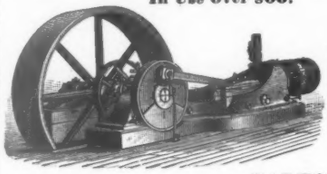

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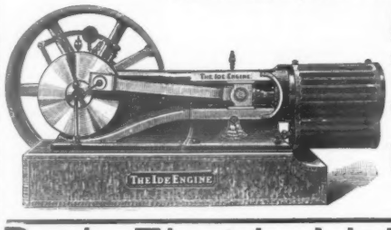

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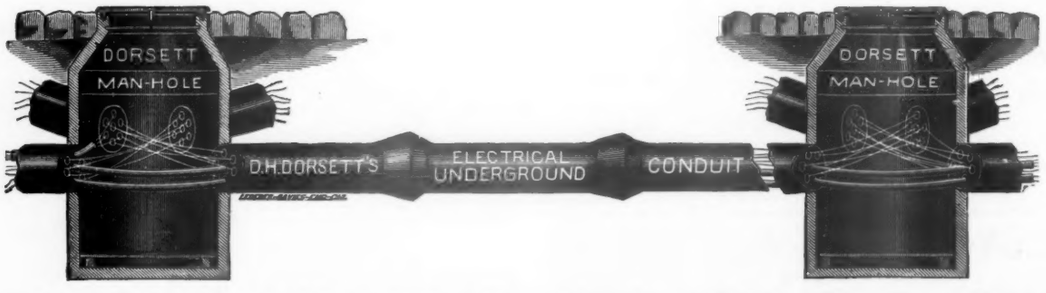

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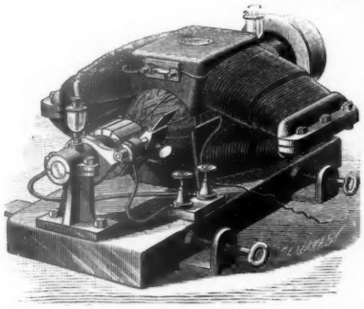

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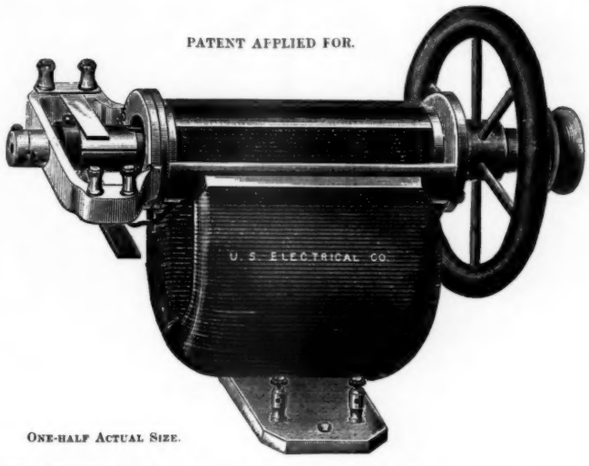

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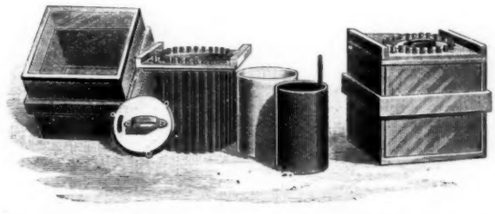

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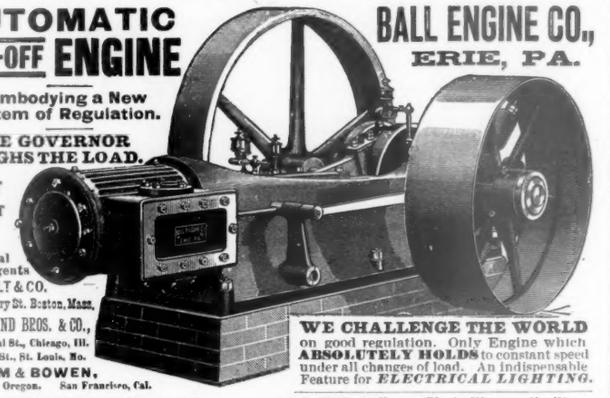

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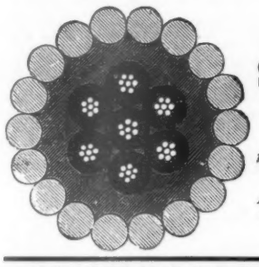

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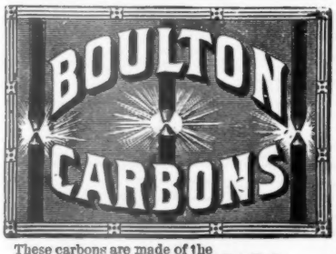

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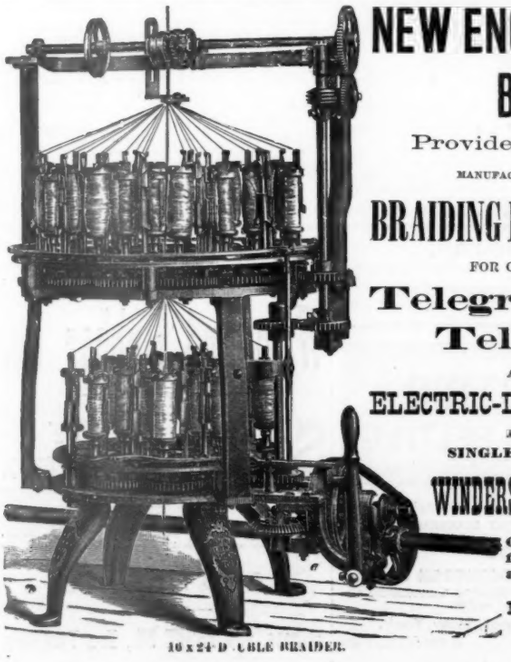

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ELECTRICAL REVIEW

[ILLUSTRATED.]

A WEEKLY JOURNAL OF

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The Oram Telephone Time Repeater.

This invention may be called the "time heart," whose electrical pulsations permeate every part of the telephone system, carrying to its every organ the hour, minute and second of time as it passes, where you may at any time hear the exact position of the hour, minute and second hand of the observatory clock. Only one instrument is required for an entire city. It utilizes all of the telephones as they exist, without any change whatever. All telephones thus become useful as accurate standard timekeepers, where any one may compare and correct the ever-varying watch or clock.

"Telephone time" becomes the standard, and no one is then excused for the inaccurate showing of his watch. The instrument that does this work is called the Oram Telephone Time Repeater, illustrated on this page in Fig. 1. It is enclosed in a case seven inches square. In Fig. 2 there are shown two electro magnets and armatures, which are placed between two brass plates. One, *m*, for transmitting the "buzz" signal and releasing the actuating mechanism; the other, *n*, for transmitting the hour and minute signals. Between the same plates are two spring barrels each containing springs about one and one-half inches wide, both of these barrels gear into the same center pinion of a train of wheels and pinions heavier but otherwise similar to that of an eight-day clock. This center pinion pivot extends through the upper plate, and has rigidly fixed upon it a crown wheel shown in the cut. The arbor of the fourth wheel also extends above the plate and carries with it the circuit closer *c c'*. A projection from the same arbor abuts against the armature first mentioned, holding the train at rest. The train is provided with a weighted recoil beat escapement, which when released permits the circuit closer to make one revolution in about thirty seconds.

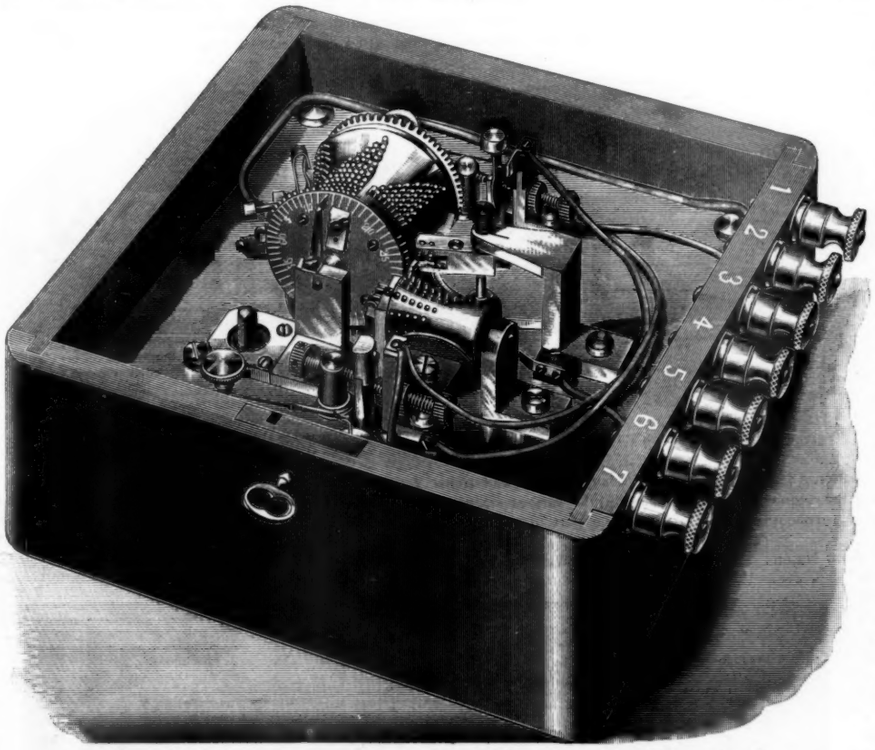

FIG. 1.—THE ORAM TIME REPEATER FOR GIVING EXACT TIME OVER TELEPHONES.

The minute cylinder *D* and its gear wheel, shown on end of axis of minute cylinder, are mounted directly above and geared into the crown wheel. Both the crown and gear wheel having same number of teeth revolve in unison. This cylinder turns one sixtieth of a revolution, while the circuit closer turns one complete revolution. Each being a part of the same train their relative position remains always the same.

The hour cylinder *D'* is turned one space during the fifty-ninth minute of each hour by the tooth of the minute cylinder engaging the pinion of the hour cylinder.

The apparatus for preventing the transmission of an erroneous signal and for sounding an alarm in case the transmitter and clock get out of unison, is arranged as follows: *E* is an electro magnet to operate the bell hammer. It is in a local circuit with battery *L'*. The circuit closer *b* in the same circuit is normally closed, but is held open during each tenth minute by projections *J* on drum *D*. In the same circuit and during the same minute the contact *d* is closed by the standard clock *T*, where the circuit is normally open. The circuit is therefore closed at *d* and opened at *b* during the same minute. Hence the circuit is never completed so long as *T* and *D* are in unison. But should *D* fail to open the circuit the minute *T* closes it, the circuit will be completed at both points and an alarm will be sounded on bell *j*. The action of the bell armature also unlatches the switch *U*, which drops and opens the local circuit at V^2 through *n*, thus preventing further action of its signalling relay until unison between *D* and *T* is restored and the switch *U* closed by an attendant. The transmission of an erroneous signal is thus prevented by failure of unison between the clock and transmitter. The position of the cylinder *D* may be set or changed with respect to the circuit closer by withdrawing the spring bolt which permits it to turn freely upon its axis.

The operation of the system is as follows: The first second of every minute the Standard clock *T* causes the snail *y*, which is placed upon the second hand pivot of the clock to close the contacts at *z*, energizing the magnet *M*; contact points *O* and *O'* are brought together, the elasticity of the spring 1' causing them to make and break the circuit rapidly for a moment, thus completing a circuit *via* earth, battery *B*, main line M^2, annunciator ground 3', annunciator 5 and telephone 2', producing a "buzz" signal in the telephone. The armature projection *X* is at the same time moved out of the path of the detent *y*, and the motor starts into operation carying the circuit closer *C' C* over the design lines on *D* and *D'*. Meanwhile *D* slowly advances, so that when the circuit closer has made a complete revolution *D* has advanced sufficiently to change the signal, presenting one next to be transmitted. As *c* and *c'* makes and breaks circuit through magnet *n*, the main circuit is made and broken and a signal is transmitted composed of one, two or three groups of electric impulses according to the time signal transmitter.

An example: Two o'clock and forty-six minutes (2.46) is transmitted thus. The first second the "buzz," then two "taps," then four "taps," then six "taps." Thus: * (buzz), . . (2), ... (4), ... (6). When an 0 occurs as 3.04 it may be known by the length of time between the hour and minute signals, thus: 3.40 the four is heard immediately after the three; while in 3.04 a much longer time elapses between the three and four.

The Time Repeater is now in use in Cincinnati and Chicago, giving time signals to all the telephone subscribers in each city. Other large exchanges will soon adopt the Repeater.

This instrument also transmits Standard time over the District Telegraph System, by connecting the local circuit of a pole changer through posts 2 and 6, Fig. 1, and the pole-changer reversing the main battery of the district circuit. On this main circuit are placed shunted polarized time bells. By pressing a button this shunt is opened, and the reversals of the main battery signal the time upon the bell whenever desired.

By this system Standard time is distributed every minute to an entire city, and guaranteed to be correct to a second at all time. An achievement which seemed so nearly impossible that it has never before been attempted.

A Long Private Line.

One of the most notable business undertakings on the Pacific coast is the private telephone line of Hon. N. D. Rideout and the gentlemen associated with him in his widely-extended business enterprises. This telephone line is 151 miles in length, and connects the principal business cities of the Sacramento valley with the Capital of the State. It is believed that this is the largest private telephone line in the world. The line starts from the California State Bank and the Pioneer Mills in Sacramento, and crossing the American river, runs through the counties of Sacramento, Placer and Yuba to Marysville, a distance of fifty miles. At Marysville there are telephone instruments in the Buckeye Flouring Mills, the banking-house of Rideout & Smith, and the office of the Northern California Railroad.

From Marysville the line runs to Oroville, the county seat of Butte county, with instruments at Moore's Station, on the railroad, and in the bank of Rideout & Smith and the railroad office at Oroville. There is a branch line eleven miles in length from Moore's Station to Gridley, on the California and Oregon Railroad. From Oroville the line extends to Chico, with instruments in the Bank of Butte County and the office of C. F. Lusk, the attorney of the Glenn estate. From Chico the line runs west across the Sacramento river to Jacinto, the head-quarters of the Glenn tract of land, where there is an instrument for the transaction of the business of that great property. From Jacinto the line runs to Willows, on the California Northern Railroad. This telephone line connects the six banks of which Mr. Rideout is the head; the two great flouring establishments, the Pioneer Mills at Sacramento and the Buckeye Mills at Marysville; the offices of the Northern California Railroad, that runs from Marysville to Oroville, and the offices of the Glenn estate, with its immense farming interests. The business facilities which this line affords are very great. Mr. Rideout can sit in his office and know what is being done in the six banks which he manages, on the railroad of

which he is head, in the two large flouring mills in which he is interested, and on the immense Glenn estate, of which he is the administrator. The wire used in constructing the line is an unusually large one, made of copper, and the transmission of speech over it is very perfect.

A Great Manufactory of Electric Lighting Apparatus.

THE EXTENSIVE FACTORY OF THE BRUSH COMPANY IN CLEVELAND, OHIO, ILLUSTRATED AND DESCRIBED.

The REVIEW is pleased to present to its readers several views of the works of the Brush Electric Company, of Cleveland, Ohio, and a description that will interest all our electric lighting friends. To Mr. H. C. Hovey, in the columns of our valued contemporary the *Scientific American*, we are indebted for much of the detailed information which follows. A portion of these work was described in the REVIEW a few years ago, but since that time a wonderful growth and extension has occurred, and the area now covered by the buildings is about seven acres. The main machine shop is one story high and 265 feet by 122 feet in its dimensions. The "cathedral," so called on account of its peculiar shape, is two and a half stories high, and measures on the ground plan 200 by 100 feet. The power building is 120 by 110 feet; the carbon house, 600 by 62 feet; the pattern room and carpenter shop, 120 by 70 feet; the lumber room, 80 by 50 feet; the coke house, two stories high, 160 by 60 feet; besides the oil room, tin shop, blacksmith shop, stables, etc. There are five tall chimneys, about 125 feet high, besides several smaller ones. There is an exhibition hall for showing all the styles of lamps, dynamos, electro-plating apparatus, electric motors, and other machines constructed there. An incandescent machine in the factory supplies whatever light may be needed, and there is an auxiliary storage battery in the basement, the current for charging which comes from a machine in the factory. This same machine also charges the batteries for several offices in the factory, for the engine room, the armature and magnet department and the stables.

The main shops are entered from Mason street, where is also the time-keeper's office. Each of the 400 workmen as they pass through the gate drop a card into a box provided for the purpose. At the beginning of each day's work every workman is provided, as he enters the factory, with a daily time ticket, on which he records during the day the particular kind of work he is doing and the number of hours he has worked. These tickets are all collected at night, and by this simple system the superintendent readily keeps track of the workmen, and ascertains the exact cost of all repairs and of all new work.

In the main shop are manufactured the dynamos, arc lamps, and indeed all other apparatus requiring the use of machinery. The castings of all sorts are received at the east end of the shop, the end nearest the general offices, and go through the several departments in order until they reach the west end, near the railroad track, where, in a finished state, they are packed and shipped to all parts of the world. One of the most noticeable features of these shops is the perfection of all the machinery in use. Everything is made of the best material and in the best style of workmanship. The long lines of shafting are bright, clean, and true, suggesting the hand and eye of a master in its erection.

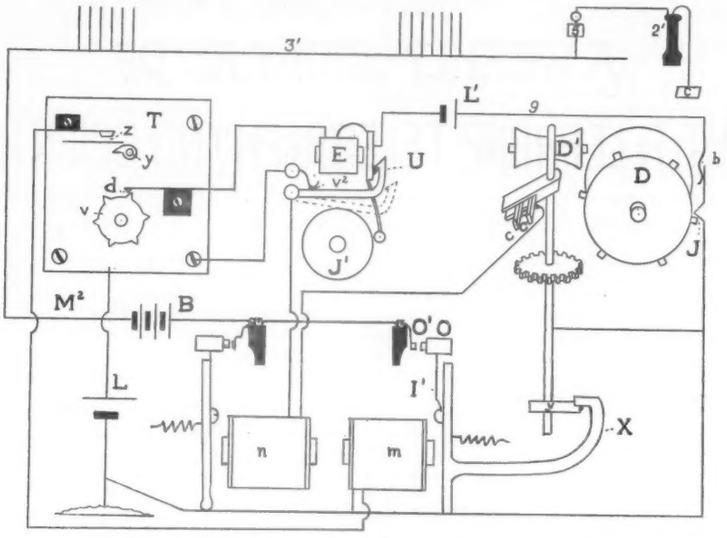

FIG. 2.—SHOWING PLAN OF ORAM TELEPHONE TIME REPEATER.

The heavier machines, such as the planers, drill presses, lathes, some of them being very ponderous, are all placed on solid stone foundations. There are cranes, tramways, etc., for handling heavy castings, and transporting machines in the various stages of construction from one part of the shop to another.

Beginning at the east end of the shop, the first thing to be noticed is the manufacture of the armature. This was formerly made of cast iron. But that method was objectionable on account of the cross (Foucault) currents, to avoid which the armature is now made of numerous thin layers of soft hoop iron, the core being laid in a coil, and the other pieces being put on transversely in such a manner as to form openings for the wire bobbins. When the armature has been fitted to its hub, and perfectly balanced, it goes to the winding department, which will be described hereafter. The shafts for the dynamos are all made from open hearth steel (Siemens-Martin) turned and fitted to hardened rings and caliper gauges so exactly as to be interchangeable. As an illustration of this, the company sent a machine to England five years ago, and has just sent to the purchaser a new shaft, which fitted as perfectly as if it had been made for that very machine. The hubs, which are also interchangeable, are usually cast from German silver; though in some recent instances Cowles' aluminum brass has been used with admirable results—a material that has a tensile strength of 95,000 pounds per square inch. The commutator, which is attached to and turns with the shaft of the dynamo, is built up from a wooden ring, that is covered with a shell made of the toughest Manila paper wound up with a shellac filling, through which the wire runs to connect with the armature. Outside this paper shell are insulated brass segments, of which there are as many as there are coils on the armature, each set of segments being connected by wires with a corresponding pair of bobbins. Thus each pair has a current passing through it only during three-fourths of a revolution and rests during the remaining quarter, meanwhile keeping its own circuit open by means of its segments.

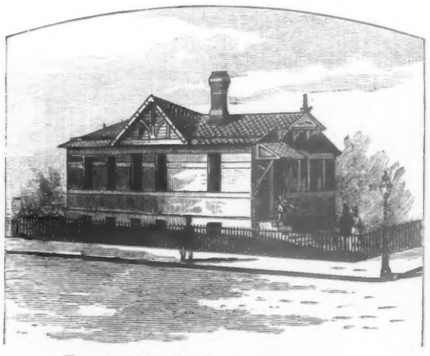

FIG. 5.—MR. BRUSH'S LABORATORY.

FIG. 6.—VIEW OF OFFICE OF BRUSH ELECTRIC CO.

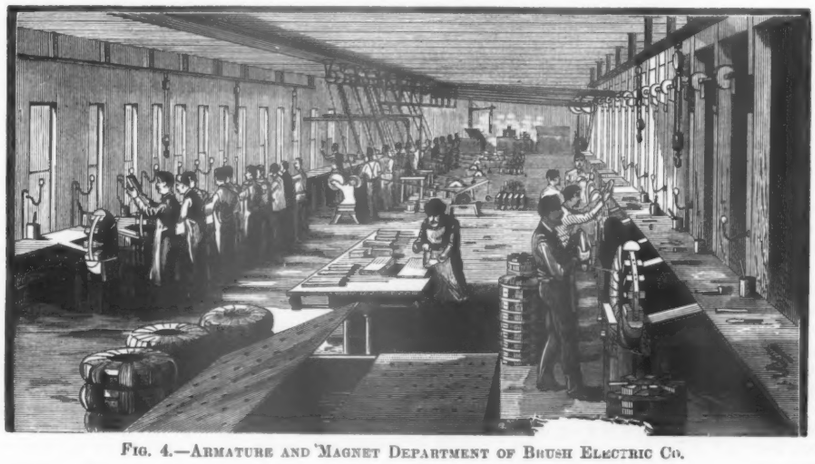

FIG. 4.—ARMATURE AND MAGNET DEPARTMENT OF BRUSH ELECTRIC CO.

In the planing department, which is quite extensive, the chairs, magnets, and rails are planed and carefully fitted. They are then tested for softness and quality, and afterward drilled to standard gauges. One end of each magnet is distorted to form a pole piece, and this is grooved to prevent cross currents. Having again been rigidly inspected, the parts of the machine are then set up on dummy shafts and armatures, and once more tested to see if they are in all respects perfect.

In the "lamp details" department, all the details of the varieties of lamps made here are manufactured. The parts are made by means of hardened jigs and fitted together with exact nicety. All this work undergoes rigid inspection before going to the assembler.

The testing room is provided with a testing rack, switch boards, resistance board and other contrivances for testing arc lamps and incandescent lamps. Opposite the main entrance is a brilliant display of arc lights, sometimes as many as one hundred and fifty being tested at once. Each light having 2,000 candle-power, it follows that the 150 collectively would have the equivalent of 300,000 candles.

Groups of incandescent lamps are to be seen among the arc lamps, placed there to test "the multiple series cut-out," lately invented by Mr. Brush, and of which more than 600 are now in successful use.

The general stock room is centrally located. So also is the superintendent's office, being elevated six feet to enable him to overlook the entire machine shop, and by a system of call bells he can at will summon to him the foreman of any department.

Leaving now the main building, we cross an open passage way and enter a huge structure styled the cathedral. A portion of it is occupied by the factory of the Swan Lamp Manufacturing Company, for making the Swan incandescent lamp.

The greatest possible care must be taken in winding, to see that the wire is properly put on, and that all the bobbins of any given armature are exactly of the same size. All this work has to be done by hand, because it requires such expert manipulation at each step; and for the same reason there are but few men successful in this department. Each armature requires a specific number of convolutions for its successful working; and all calculations as to the length of the wire must be exact to within one one-thousandth of a inch. Too little wire will overheat, and too much will offer too great resistance. In this department the best of materials are used for insulation, con-